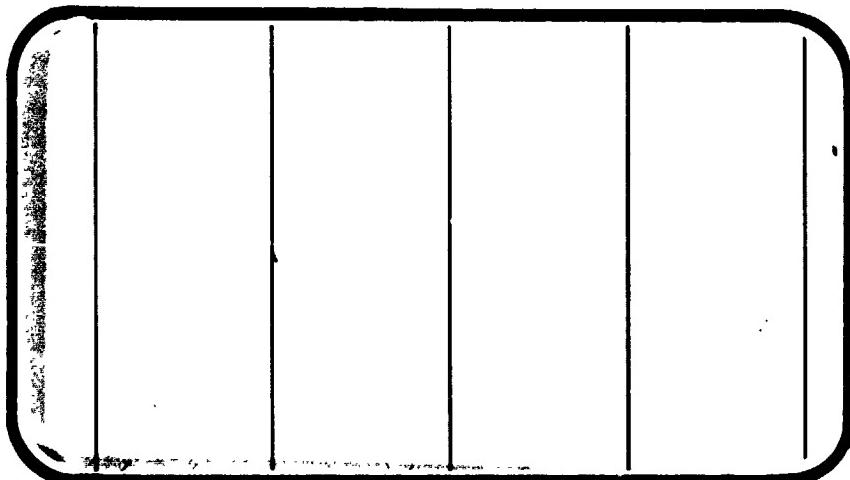


NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



(NASA-CR-151062) SUPERSONIC CONTROL  
EFFECTIVENESS FOR FULL AND PARTIAL SPAN  
ELEVON CONFIGURATIONS ON A 0.0165 SCALE  
MODEL SPACE SHUTTLE ORBITER TESTED IN THE  
LARC UNITARY PLAN WIND TUNNEL (Chrysler

N77-20147  
HC A06/MF A01  
Unclassified  
G3/16 22842

SPACE SHUTTLE

AEROTHERMODYNAMIC DATA REPORT

JOHNSON SPACE CENTER  
HOUSTON, TEXAS

DATA MANAGEMENT SERVICES  
SPACE DIVISION  CHRYSLER  
CORPORATION



March 1977

DMS-DR-2182  
NASA CR-151,062

SUPersonic CONTROL EFFECTIVENESS FOR FULL AND  
PARTIAL SPAN ELEVON CONFIGURATIONS ON A 0.0165  
SCALE MODEL SPACE SHUTTLE ORBITER TESTED IN  
THE LaRC UNITARY PLAN WIND TUNNEL (LA49)

Prepared under NASA Contract Number NAS9-13247

by

Data Management Services  
Chrysler Corporation Michoud Defense-Space Division  
New Orleans, La. 70189

for

Engineering Analysis Division

Johnson Space Center  
National Aeronautics and Space Administration  
Houston, Texas

**WIND TUNNEL TEST SPECIFICS:**

Test Number: LaRC UPWT (Leg 2) 1101  
NASA Series Number: LA49  
Model Number: 089B-139  
Test Dates: April 24 through 26, 1974  
Occupancy Hours: 30

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Chrysler Corporation Michoud Defense-Space Division assumes no responsibility for the data presented other than display characteristics.

SUPersonic CONTROL EFFECTIVENESS FOR FULL AND  
PARTIAL SPAN ELEVON CONFIGURATIONS ON A 0.0165  
SCALE MODEL SPACE SHUTTLE ORBITER TESTED IN  
THE LARC UNITARY PLAN WIND TUNNEL (LA49)

ABSTRACT

An experimental investigation has been conducted in the NASA-Langley Research Center Unitary Plan Wind Tunnel (Ref. 2) on an early version of the space shuttle orbiter (designated 089B-139) 0.0165 scale model to systematically determine both longitudinal and lateral control effectiveness associated with various combinations of inboard, outboard, and full span wing trailing edge controls. This report presents results from supersonic investigations conducted from April 24 through 26, 1974. The test Mach numbers were 2.5 and 4.63 over an angle of attack range from  $-4^{\circ}$  to  $40^{\circ}$  at  $0^{\circ}$  sideslip.

## TABLE OF CONTENTS

	Page
ABSTRACT	iii
INDEX OF MODEL FIGURES	2
INDEX OF DATA FIGURES	3
NOMENCLATURE	5
INTRODUCTION	9
CONFIGURATIONS INVESTIGATED	10
TEST CONDITIONS	11
TEST FACILITY DESCRIPTION	12
DATA REDUCTION	13
REFERENCE	14
TABLES	
I. TEST CONDITIONS	15
II. DATA SET/RUN NUMBER COLLATION SUMMARY	16
III. MODEL DIMENSIONAL DATA	17
FIGURES	
MODEL	24
DATA	31
APPENDIX	
TABULATED SOURCE DATA	

INDEX OF MODEL FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1.	Axis Systems	24
2.	Model Sketches	
	a. SFW Orbiter Configuration	25
	b. Slotted Elevon - E <sub>43</sub> (6 inch gap)	26
3.	Model Photographs	
	a. Orbiter Configuration, Front, 3/4 View	27
	b. Orbiter Configuration, Rear, 3/4 View	28
	c. View of Elevon Drive Motors	29

INDEX OF DATA FIGURES

FIGURE NUMBER	TYPE	TIME	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	PAGE
1	FULL SPAN ELEVON PITCH CHARACTERISTICS		ELEVON	A	1-4
5	OUTBOARD ELEVON PITCH CHARACTERISTICS		ELEVON	A	4-5
6	CUTBOARD ELEVON PITCH CHARACTERISTICS		ELEVON	A	7-12
7	FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS		ALPHA, ELEVON	B	15-16
8	OUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS		ALPHA ELEVON-LI	C	20-26
9	CUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS		ALPHA ELEVON-LO	D	27-33
10	COMPARISON OF FULL SPAN, BOARD AND CUT- BOARD PITCH CONTROL ( $\delta_e = -10$ )		ELEVON	E	34-35
11	COMPARISON OF FULL SPAN INBOARD AND CUT- BOARD PITCH CONTROL ( $\delta_e = -20$ )		ELEVON	E	36-37
12	COMPARISON OF FULL SPAN, INBOARD AND CUT- BOARD PITCH CONTROL ( $\delta_e = -40$ )		ELEVON	E	38-39
13	CUTBOARD ATTITUDE EFFECTIVENESS WITH IN- BOARD ELEVON DEFLECTED		ATTITUDE	F	40-41
14	COMPARISON OF FULL SPAN AND CUTBOARD ELEVON DEFLECTION FOR SOIL ( $\delta_e = -10$ )		ATTITUDE	F	42-43

INDEX OF DATA FIGURES (Concluded)

FIGURE NUMBER	TITLE	CONDITIONS VARYING	PLOTTED COEFFICIENTS SCHEDULE	PAGE
15	COMPARISON OF FULL SPAN AND OUTBOARD ELEVON DEFLECT. FOR ROLL ( $\delta_e = -20$ )	AIRRON	F	44-45
16	COMPARISON OF CONTROL EFFECTIVENESS FOR FULL SPAN AND INBD. ELEVON	ELEVON	G	46
17	COMPARISON OF CONTROL EFFECTIVENESS FOR FULL SPAN AND OUTBD. ELEVON	ELEVON	H	47

PLOTTED COEFFICIENTS SCHEDULE:

- A) CL, CLM, CD, L/D versus ALPHA
- B) CLM versus ELEVTR, DCL/DE, DCD/DE, DCLMDE versus ALPHA
- C) CLM versus ELV-LI, DCL/DE, DCD/DE, DCLMDE versus ALPHA
- D) CLM versus ELV-LO, DCL/DE, DCD/DE, DCLMDE versus ALPHA
- E) DCL/DE, DCD/DE, DCLMDE versus ALPHA
- F) DCY/DA, DCYMDA, DCBILDA versus ALPHA
- G) DCMIDE, DCLMDE, DCMI/F versus ALPHA
- H) DCMODE, DCLMDE, DCMO/F

NOMENCLATURE  
General

<u>SYMBOL</u>	<u>HEMNIC</u>	<u>DEFINITION</u>
a		speed of sound; m/sec, ft/sec
C <sub>p</sub>	CP	pressure coefficient; $(p_1 - p_\infty)/q$
M	MACH	Mach number; V/a
p		pressure; N/m <sup>2</sup> , psf
q	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$ , N/m <sup>2</sup> , psf
RN/L	RN/L	unit Reynolds number; per m, per ft
V		velocity; m/sec, ft/sec
$\alpha$	ALPHA	angle of attack, degrees
$\beta$	BETA	angle of sideslip, degrees
$\psi$	PSI	angle of yaw, degrees
$\phi$	PHI	angle of roll, degrees
$\rho$		mass density; kg/m <sup>3</sup> , slugs/ft <sup>3</sup>

Reference & C.G. Definitions

A <sub>b</sub>		base area; m <sup>2</sup> , ft <sup>2</sup>
b	BREF	wing span or reference span; m, ft
c.g.		center of gravity
L <sub>REF</sub>	LREF	reference length or wing mean aerodynamic chord; m, ft
S	SREF	wing area or reference area; m <sup>2</sup> , ft <sup>2</sup>
	MRP	moment reference point
	XMRP	moment reference point on X axis
	YMRP	moment reference point on Y axis
	ZMRP	moment reference point on Z axis

SUBSCRIPTS

b	base
l	local
s	static conditions
t	total conditions
$\infty$	free stream

NOMENCLATURE (Continued)

Body-Axis System

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
$C_N$	CN	normal-force coefficient; $\frac{\text{normal force}}{qS}$
$C_A$	CA	axial-force coefficient; $\frac{\text{axial force}}{qS}$
$C_Y$	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
$C_{Ab}$	CAB	base-force coefficient; $\frac{\text{base force}}{qS}$ $-A_b(p_b - p_\infty)/qS$
$C_{Af}$	CAF	forebody axial force coefficient, $C_A - C_{Ab}$
$C_m$	CTM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS/\text{REF}}$
$C_n$	CYN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qSb}$
$C_l$	CBL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qSb}$

Stability-Axis System

$C_L$	CL	lift coefficient; $\frac{\text{lift}}{qS}$
$C_D$	CD	drag coefficient; $\frac{\text{drag}}{qS}$
$C_{D_b}$	CDB	base-drag coefficient; $\frac{\text{base drag}}{qS}$
$C_{D_f}$	CDF	forebody drag coefficient; $C_D - C_{D_b}$
$C_Y$	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
$C_m$	CLM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS/\text{REF}}$
$C_n$	CLN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qSb}$
$C_l$	CSL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qSb}$
L/D	L/D	lift-to-drag ratio; $C_L/C_D$
L/D <sub>f</sub>	L/DF	lift to forebody drag ratio; $C_L/C_{D_f}$

NOMENCLATURE (Continued)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
$C_{D\delta_e}$	DCD/D <sup>e</sup>	Slope of drag coefficient vs. elevon deflection curve; $dC_D/d\delta_e$ , per degree
$C_{L\delta_e}$	DCL/D <sup>e</sup>	Slope of lift coefficient vs. elevon deflection curve; $dC_L/d\delta_e$ , per degree
$C_I\delta_a$	DCBLDA	Slope of rolling moment coefficient vs. aileron deflection curve, $dC_I/d\delta_a$ , per degree
$C_m\delta_e$	DCLMDE	Slope of pitching moment coefficient vs elevon deflection curve, $dC_m/d\delta_e$ , per degree
$C_Y\delta_a$	DCY/D <sup>a</sup>	Slope of side force coefficient vs. aileron deflection curve, $dC_Y/d\delta_a$ , per degree
$C_n\delta_a$	DCYNDA	Slope of yawing moment coefficient vs. aileron deflection curve, $dC_n/d\delta_a$ , per degree
$\delta_a$	AIRLON	Aileron deflection angle; elevon deflection for roll control, $(\delta_{aL} - \delta_{aR})/2$ , positive deflection left panel trailing edge down.
$\delta_e$	ELEVTR	Elevator deflection angle; elevon deflection for pitch control $(\delta_{eL} + \delta_{eR})/2$ , positive deflection trailing edge down
$\delta_{eL_O}$	ELV-LO	Left outboard elevon panel deflection, degrees
$\delta_{eL_I}$	ELV-LI	Left inboard elevon panel deflection, degrees
$\delta_{eR_I}$	ELV-RI	Right inboard elevon panel deflection, degrees
$\delta_{eR_O}$	ELV-RO	Right outboard elevon panel deflection, degrees
$C_m\delta_{eI}$	DCMIDE	Slope of pitching moment coefficient versus inboard elevon deflection curve, per degree

NOMENCLATURE (Concluded)

<u>SYMBOL</u>	<u>MEMONIC</u>	<u>DEFINITION</u>
$C_m \delta_{e_o}$	DC1ODE	Slope of pitching moment coefficient versus outboard elevon deflection curve, per degree.
	DCMI/F	Ratio of the slopes of the inboard elevon pitching moment curve over the full span elevon pitching moment curve.
	DCMO/F	Ratio of the slopes of the outboard elevon pitching moment curve over the full span elevon pitching moment curve.
$\delta_{SB}$	SPDBRK	speed brake deflection angle, degrees
$\delta_{BF}$	BDFLAP	body flap deflection angle, degrees

## INTRODUCTION

As a continuing effort to identify the most suitable space shuttle concept, a joint study between Langley Research Center, Johnson Space Center, and Rockwell International has been undertaken to determine if the independent operation of the four elevon surfaces of the orbiter could result in a more efficient use of available control power, reduced elevon hinge moments, and associated aeroelastic wing bending, or allow a more flexible flight profile without adverse control characteristics.

Therefore, an experimental investigation at subsonic and supersonic speeds was initiated at Langley to systematically determine both longitudinal and lateral control effectiveness associated with various combinations of inboard, outboard, and full span wing trailing edge controls for a shuttle orbiter configuration. Due to the unavailability of a current vehicle model, the model employed in this study was an 0.0165 scale earlier version of the orbiter designated by Rockwell International as configuration 089B-139. The differences between this configuration and the current design ("Vehicle 5") were not felt to be sufficient to alter the incremental effectiveness presented herein. This report presents the initial supersonic results obtained in the overall study. Utilizing the Langley Unitary Plan Wind Tunnel, the Mach numbers of the investigation were 2.5 and 4.63. Angle of attack was varied from about  $-1^{\circ}$  to as much as  $42^{\circ}$  at  $0^{\circ}$  of sideslip. Transonic results are presented in the reference.

## CONFIGURATIONS INVESTIGATED

The configuration tested was a 0.0165 scale model of a blend of Rockwell International Shuttle configurations consisting of a 089B configuration with a 139B configuration nose forward of fuselage station 500. A sketch and photographs of the model are shown in figures 2 and 3, respectively. Body base flap was fixed at 0° deflection.

Elevon controls were split at 0.60 b/2 giving the inboard and outboard segments approximately 53 percent and 47 percent of the total elevon area, respectively. The surfaces could be deflected in unison or as individual panels. Maximum range of deflection for each panel was from 0° to -40°. Combinations tested included: for pitch control, inboards only, outboards only and full span; for roll control, outboards, only with full span and inboard deflected for pitch control.

To expedite testing, the elevons were remotely controlled by four internal electric motors (see fig. 2c).

A complete description of model dimensional data is given in table III.

#### TEST CONDITIONS

The model was sting supported, with aerodynamic forces and moments measured by an internally mounted six-component strain gage balance. Model angle of attack was varied from about  $-4^{\circ}$  to as much as  $42^{\circ}$  at an angle of sideslip of  $0^{\circ}$ . Reynolds number was constant at a nominal  $2.0 \times 10^6$  per foot. Angle of attack has been corrected for deflection of the sting and balance under load.

Transition strips 0.16 cm wide composed of No. 60 sand grit were located 1.0 inch aft of the apex of the fuselage and 0.5 inch (measured streamwise) aft of the wing and fillet and vertical tail leading edges.

Drag data presented herein represent gross drag; in that measured drag is uncorrected for base pressure effects.

#### TEST FACILITY DESCRIPTION

The NACA Langley Research Center 4 foot Unitary Plan Wind Tunnel (UPWT) is a closed-circuit continuous flow, variable density facility. The test section is 4 feet by 4 feet by 7 feet long.

Two tunnel legs are available for supersonic testing in the Mach number ranges 1.47 to 2.86 (Leg No. 1) and 2.29 to 4.63 (Leg No. 2). Leg No. 2 was used for this test. An asymmetric, sliding block nozzle position and total pressure setting provide the test Mach numbers at a specified Reynolds number. Reynolds number can be varied from 0.76 to 7.78 million per foot. Available stagnation pressure variation is 4.0 to 142 psia. Dynamic pressure variation is 95 to 1260 psf with normal operating stagnation temperature about 150°F in Mach modes 2 or 3 and about 175°F in Mach mode 4. The tunnel is equipped with a dry air supply, an evacuating system, and a cooling system. The facility power is approximately 83,000 horsepower.

Model mounting provisions consist of various sting arrangements, including axial (longitudinal), lateral (independent pitch and yaw), and roll movement with side wall support. A Schlieren system and oil flow visualization equipment are available. Data are recorded at the tunnel and reduced off-line at the Langley Computer Center. The tunnel is used for force and moment, pressure, and dynamic stability tests. Hot and cold jet effects and heat transfer have been studied in the UPWT.

## DATA REDUCTION

Data was recorded at the facility and reduced off-line at the LaRC Computation Center. Longitudinal data are referred to the stability-axis system and lateral-directional data are referred to the body-axis system. All coefficients are normalized with respect to the projected wing area (excluding the fillet), mean aerodynamic chord or span, which are:

$$SPEF = \text{wing projected area} = 0.732 \text{ ft.}^2$$

$$LREF = \text{wing mean aerodynamic chord} = 7.83\frac{1}{4} \text{ in.}$$

$$BREF = \text{wing span} = 15.45 \text{ in.}$$

All data are presented along a set of body and stability axes (Figure 1) passing through the estimated forward center of gravity located at a full scale fuselage station of 1076.48 in. or 65% of the actual body length.

Elevon and aileron derivative data were computer-generated by the Chrysler DATAMAN-GADSAC Program and represent the local slope of the coefficient vs. control deflection at each value of angle of attack.

REFERENCE

DMS-DR-2184, "TRANSONIC CONTROL EFFECTIVENESS FOR FULL AND PARTIAL SPAN ELEVON CONFIGURATIONS ON A 0.0165 SCALE MODEL SPACE SHUTTLE ORBITER TESTED IN THE LaRC 8-FOOT TRANSONIC PRESSURE TUNNEL (LA48)."

TABLE I

TEST : LARC UPWT 1101 (LA49)

DATE : 1-21-77

## TEST CONDITIONS

BALANCE UTILIZED: UT27-50

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	<u>600 lb.</u>	<u>+ 3.0 lb.</u>	
SF	<u>300 lb.</u>	<u>+ 1.5 lb.</u>	
AF	<u>50 lb.</u>	<u>+ 0.25 lb.</u>	
PM	<u>800 in-lb.</u>	<u>+ 4.0 in-lb.</u>	
RM	<u>400 in-lb.</u>	<u>+ 2.0 in-lb.</u>	
YM	<u>600 in-lb.</u>	<u>+ 3.0 in-lb.</u>	

#### COMMENTS:

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TEST : UPWT 1101 (LA-49)      TABLE II      DATA SET RUN NUMBER COLLATION SUMMARY

DATA SET IDENTIFIER	CONFIGURATION	SCHD. ELEVON DEFLECTION								NO. OF RUNS	MACH NUMBERS
		$\alpha$	$\beta$	LO	LI	RI	RO	$\alpha_{SB}$	$\alpha_{BF}$		
RH1001	089B-139 Orb.	A	0	0	0	0	0	25	0		
002				0	-10	-10	0				20
003				0	-20	-20	0				21
004				0	-40	-40	0				22
005				-10	-10	-10	-10				23
006				-20	-20	-20	-20				24
007				-40	-40	-40	-40				25
008				-10	0	0	-10				26
009				-20	0	0	-20				27
010				-40	0	0	-40				28
011				0	0	-20	-20				29
012				-10	-10	-30	-30				30
013				0	-10	-10	-20				31
014				0	-20	-20	-40				32
015				-10	-20	-20	-30				33
016				+10	-20	-20	-10				34
017				+10	-40	-40	-10				35
018				-20	-30	-30	-40				36
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											100

COEFFICIENTS

$\alpha = \beta$       A) -4° to 32° at  $M = 2.5$   
                   -4° to 40° at  $M = 4.63$

SCHEDULES

IDVAR (1)      IC-AF (2)

IDVAR (1)      IC-CV

TABLE III  
MODEL DIMENSIONAL DATA

MODEL COMPONENT : BODY - B20

GENERAL DESCRIPTION : 089B-139B (MODIFIED NOSE), NOSE SECTION FROM  
FULL-SCALE STATION 230, 0 TO STATION 500 FROM NAR DRAWING VL70-000139B.  
REMAINING BODY AFT OF STATION 500 FROM NAR VL70-000093.

MODEL SCALE 0.0165

DRAWING NUMBER : VL70-000093, VL70-000139B

DIMENSIONS :	FULL SCALE	MODEL SCALE
Length	<u>1290.0</u>	<u>21.200</u> IN.
Max Width	<u>265.0</u>	<u>4.372</u> IN.
Max Depth	<u>248.0</u>	<u>4.092</u> IN.
Fineness Ratio	<u>4.069</u>	<u>4.862</u> IN.
Area	<u>15.4000 SQ. FT.</u>	<u>17.8927 SQ. FT.</u>
Max. Cross-Sectional	<u>          </u>	<u>          </u>
Planform	<u>          </u>	<u>          </u>
Wetted	<u>          </u>	<u>          </u>
Base	<u>          </u>	<u>          </u>

TABLE III (Continued)  
MODEL DIMENSIONAL DATA

MODEL COMPONENT : BODY FLAP-F1

GENERAL DESCRIPTION : O90B-139

MODEL SCALE: 0.0165

DRAWING NUMBER : VL70-000024A

DIMENSIONS :	FULL SCALE	MODEL SCALE
Length	<u>.84.700</u>	<u>1.398</u>
Max Width	<u>.255.000</u>	<u>.4372</u>
Max Depth	<u>.21.000</u>	<u>.346</u>
Fineness Ratio	<u>—</u>	<u>—</u>
Area	<u>—</u>	<u>—</u>
Max. Cross-Sectional	<u>—</u>	<u>—</u>
Planform	<u>142.6400</u>	<u>5.5921</u>
Wetted	<u>—</u>	<u>—</u>
Base	<u>.38.0460</u>	<u>1.5151</u>

TABLE III (Continued)  
MODEL DIMENSIONAL DATA

MODEL COMPONENT : OMS PODS - M<sup>14</sup>

GENERAL DESCRIPTION 032B-132

MODEL SCALE: 0.0165

DRAWING NUMBER : VI70-000094

DIMENSIONS :

FULL SCALE      MODEL SCALE

Length	<u>346.000</u>	<u>5.709</u>
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Max Width	<u>108.000</u>	<u>1.782</u>
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Max Depth	<u>113.800</u>	<u>1.878</u>
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Fineness Ratio	<u>                </u>	<u>                </u>
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Area	<u>                </u>	<u>                </u>
------	-------------------------	-------------------------

Max. Cross-Sectional	<u>                </u>	<u>                </u>
----------------------	-------------------------	-------------------------

Planform	<u>                </u>	<u>                </u>
----------	-------------------------	-------------------------

Wetted	<u>                </u>	<u>                </u>
--------	-------------------------	-------------------------

Base	<u>                </u>	<u>                </u>
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ONE POD CONTINUATION

Z Axis Orientation	<u>113.000</u>	<u>7.451</u>
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Y Axis Rotation	<u>0.000</u>	<u>1.320</u>
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TABLE III (Continued)  
MODEL DIMENSIONAL DATA

COMPONENT SLOTTED CLEVON (1-inch GAP) - D-3  
PAL DESCRIPTION Configuration 140A/D Orbiter clevron.  
NOTE: D-3 is a slotted version of "26. Data are for one side.  
MODEL SCALE: 0.0165 MODEL DRAWING: "G-A00140  
DRAWING NUMBER \_\_\_\_\_

DIMENSIONS	FULL SCALE	MODEL SCALE
Area - $\text{Ft}^2$	<u>010.0</u>	<u>0.0572</u>
Span (equivalent) - In.	<u>340.2</u>	<u>5.762</u>
Inb'd equivalent chord - In.	<u>110.00<sup>b</sup></u>	<u>1.947</u>
Outb'd equivalent chord/ total surface chord	<u>05.19<sup>a</sup></u>	<u>0.010<sup>b</sup></u>
Ratio movable surface chord/ total surface chord	<u>_____</u>	<u>_____</u>
At Inb'd equiv. chord	<u>0.2026</u>	<u>0.2305</u>
At Outb'd equiv. chord	<u>0.400<sup>b</sup></u>	<u>0.440<sup>b</sup></u>
Sweep Back Angles, degrees	<u>_____</u>	<u>_____</u>
Leading Edge	<u>0.00</u>	<u>0.00</u>
Trailing Edge	<u>-10.05<sup>c</sup></u>	<u>-10.05<sup>c</sup></u>
Hingeline	<u>0.00</u>	<u>0.00</u>
Area Moment (Normal to hinge line)	<u>1507.0<sup>c</sup></u>	<u>0.0013<sup>c</sup></u>
Mean Aerodynamic Chord ( $\bar{c}$ ), in.	<u>21.7</u>	<u>1.401<sup>c</sup></u>

TABLE III (Continued)  
MODEL DIMENSIONAL DATA

MODEL COMPONENT WINDER - R5

GENERAL DESCRIPTION CONFIGURATION FWD LINES VIZZ-000005.

MODEL SCALE: .0165

DRAWING NUMBER VIZZ-000005

DIMENSIONS	FULL SCALE	MODEL SCALE
Area	<u>106.380 SQ. IN.</u>	<u>.0290 SQ. FT.</u>
Span (equivalent)	<u>201.00 IN.</u>	<u>3.31 IN.</u>
Inb'd equivalent chord	<u>.21.585 IN.</u>	<u>1.51 IN.</u>
Outb'd equivalent chord	<u>.50.933 IN.</u>	<u>.34 IN.</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>.400</u>	<u>.400</u>
At Outb'd equiv. chord	<u>.400</u>	<u>.400</u>
Sweep Back Angles, degrees		
Leading Edge	<u>34.83</u>	<u>34.83 deg.</u>
Trailing Edge	<u>26.25</u>	<u>26.25 deg.</u>
Hingeline	<u>34.83</u>	<u>34.83 deg.</u>
Area Moment (Normal to hinge line)	<u>506.1250 CU. IN.</u>	<u>4.084 CU. FT.</u>

TABLE III (Continued)  
MODEL DIMENSIONAL DATA

MODEL COMPONENT VERTICAL TAIL - V<sub>5</sub>

GENERAL DESCRIPTION CENTERLINE VERTICAL TAIL DOUBLE WEDGE AIRFOIL  
WITH ROUNDED LEADING EDGE.

MODEL SCALE: 0.0165

DRAWING NUMBER VL70-000025

DIMENSIONS	FULL SCALE	MODEL SCALE
Area	<u>413.2500 SQ.FT.</u>	<u>16.2011 SQ.IN.</u>
Span (equivalent)	<u>315.72</u>	<u>5.21</u> IN.
Inb'd equivalent chord	<u>268.50</u> IN.	<u>4.43</u> IN.
Outb'd equivalent chord	<u>103.47</u> IN.	<u>1.79</u> IN.
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord		
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge	<u>45.00</u> DEG.	<u>45.00</u> DEG.
Trailing Edge	<u>26.240</u> DEG.	<u>26.25</u> DEG.
Hingeline		
Area Moment (Normal to hinge line)		

## TA 52 TTI (Conv. Cen.)

MODEL COMPONENT: WING - "C"

GENERAL DESCRIPTION: CONVENTIONAL PLANE WITH TAPERED WINGS

DEFINING WING LOC. IN CHORD: EXPOSING AREA AT 0.25 MAC = 0.0157

FIRST 0.25 MAC FROM LEADING EDGE TO THE EXPOSING HYPERBOLIC LINE).

WING CHORD: 4.0157

DRAWING NUMBER: W170-000003

DIMENSIONS: FULL-SCALE MODEL SCALETOTAL DATA

Area	FULL-SCALE	MODEL SCALE
Planform	2630.0000 IN.	105.4510 C. IN.
Wetted		
Span (equivalent)	936.0000 IN.	39.0000 C. IN.
Aspect Ratio	6.000	2.400
Rate of Taper	1.177	1.177
Taper Ratio	.700	.700
Dihedral Angle, degrees	3.500 DEG.	2.500 DEG.
Incidence Angle, degrees	-1.000 DEG.	.000 DEG.
Aerodynamic Twist, degrees	.000 DEG.	.000 DEG.
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	45.000 DEG.	45.000 DEG.
Trailing Edge	-10.000 DEG.	-10.000 DEG.
0.25 Element Line	25.000 DEG.	25.000 DEG.
Chords:		
Root (Wing Sta. 0.0)	180.00 IN.	11.00 IN.
Tip, (equivalent)	130.00 IN.	8.00 IN.
MAC	117.1 IN.	7.1 IN.
Fus. Sta. of .25 MAC	117.1 IN.	7.1 IN.
W.P. of .25 MAC	22.00 IN.	1.4 IN.
B.L. of .25 MAC		
Airfoil Section		
Root		
Tip		

EXPOSED DATA

Area	FULL-SCALE	MODEL SCALE
Span, (equivalent)	1700.0000 IN.	74.5000 C. IN.
Aspect Ratio	5.000	2.000
Taper Ratio	.700	.700
Chords:		
Root	52.00 IN.	9.00 IN.
Tip	17.00 IN.	3.00 IN.
MAC	11.00 IN.	2.00 IN.
Fus. Sta. of .25 MAC	11.00 IN.	2.00 IN.
W.P. of .25 MAC	2.00 IN.	.40 IN.
B.L. of .25 MAC	1.00 IN.	.20 IN.

**Notes:**

1. Positive directions of force coefficients, moment coefficients, and angles are indicated by arrows
2. For clarity, origins of wind and stability axes have been displaced from the center of gravity

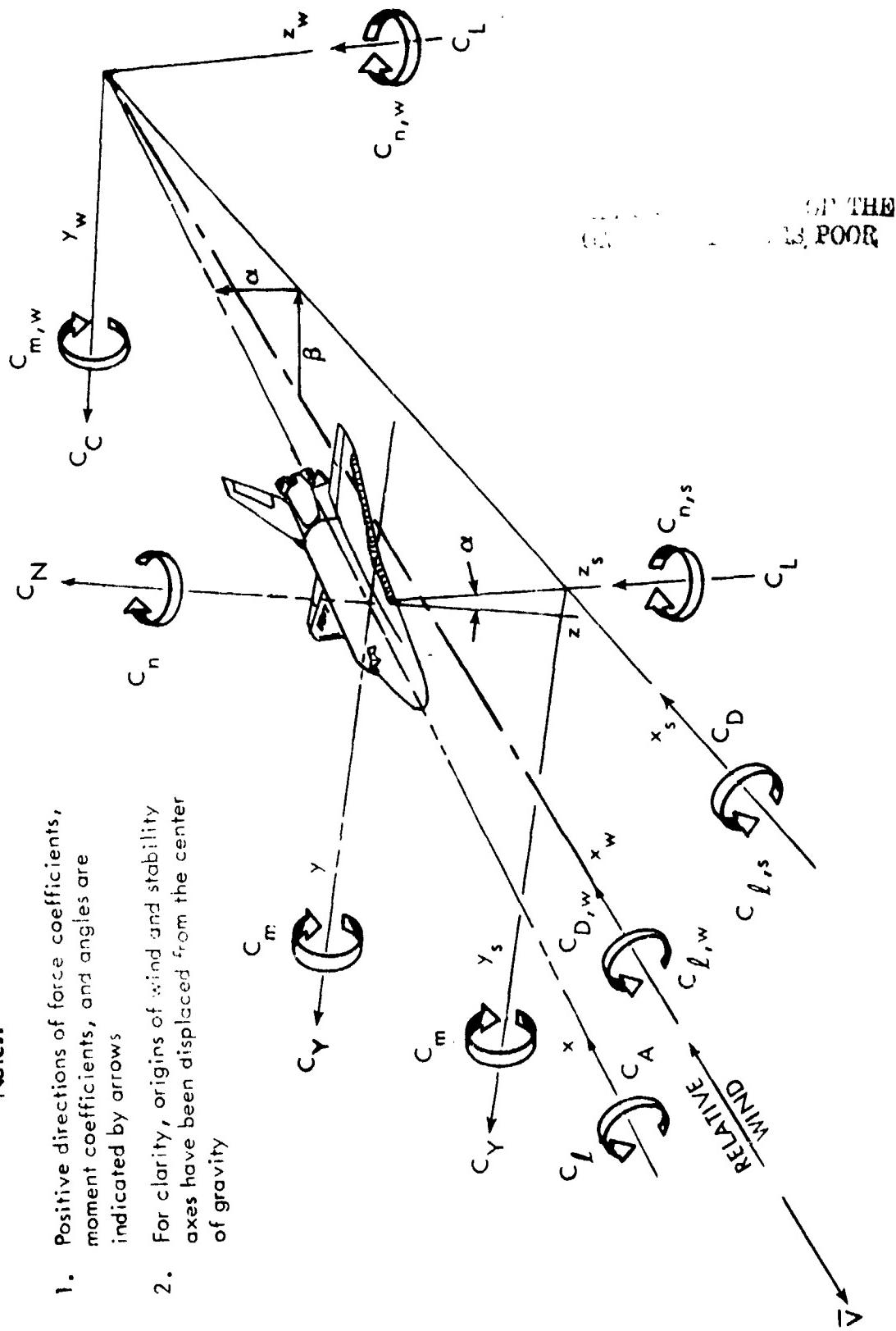
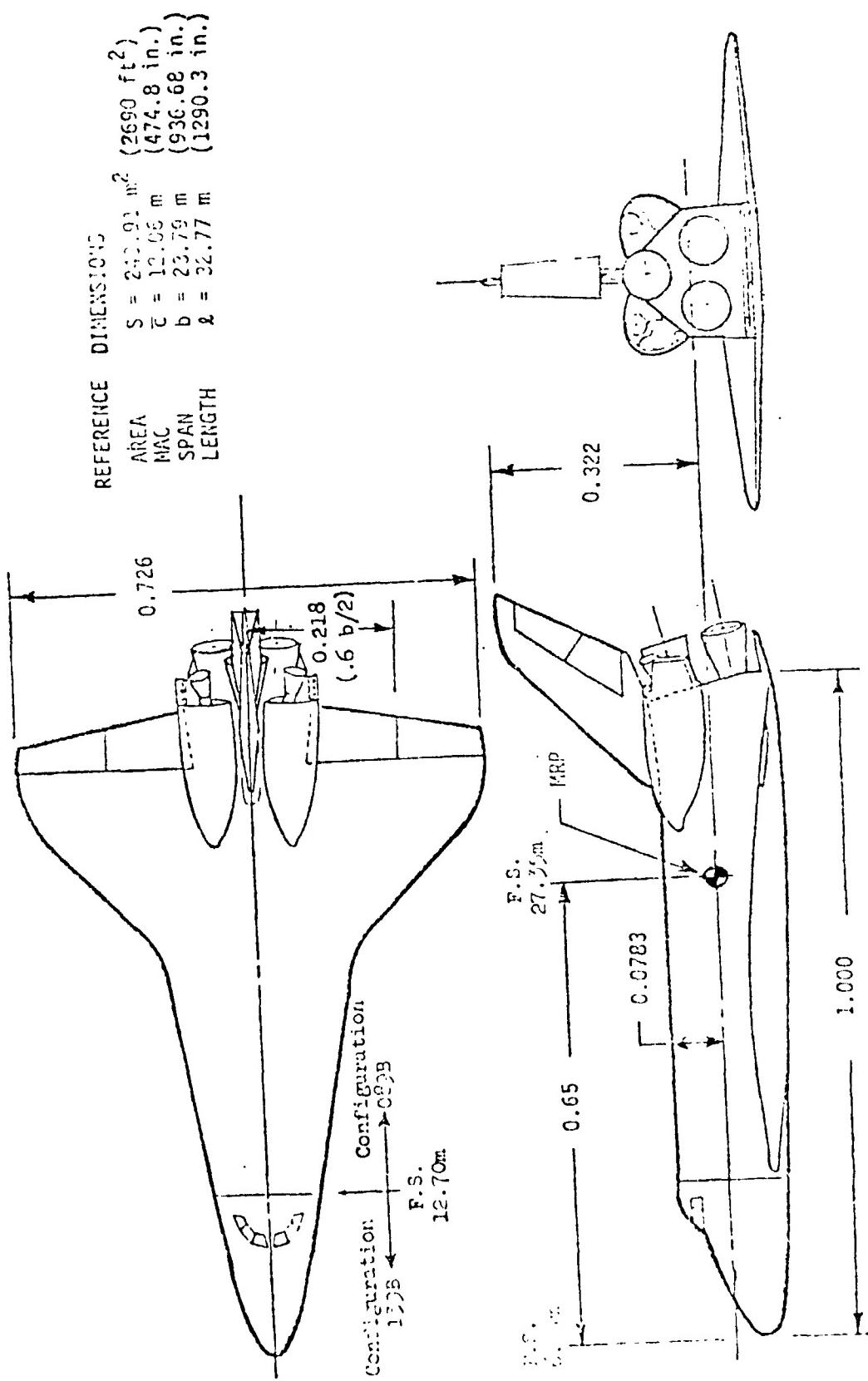
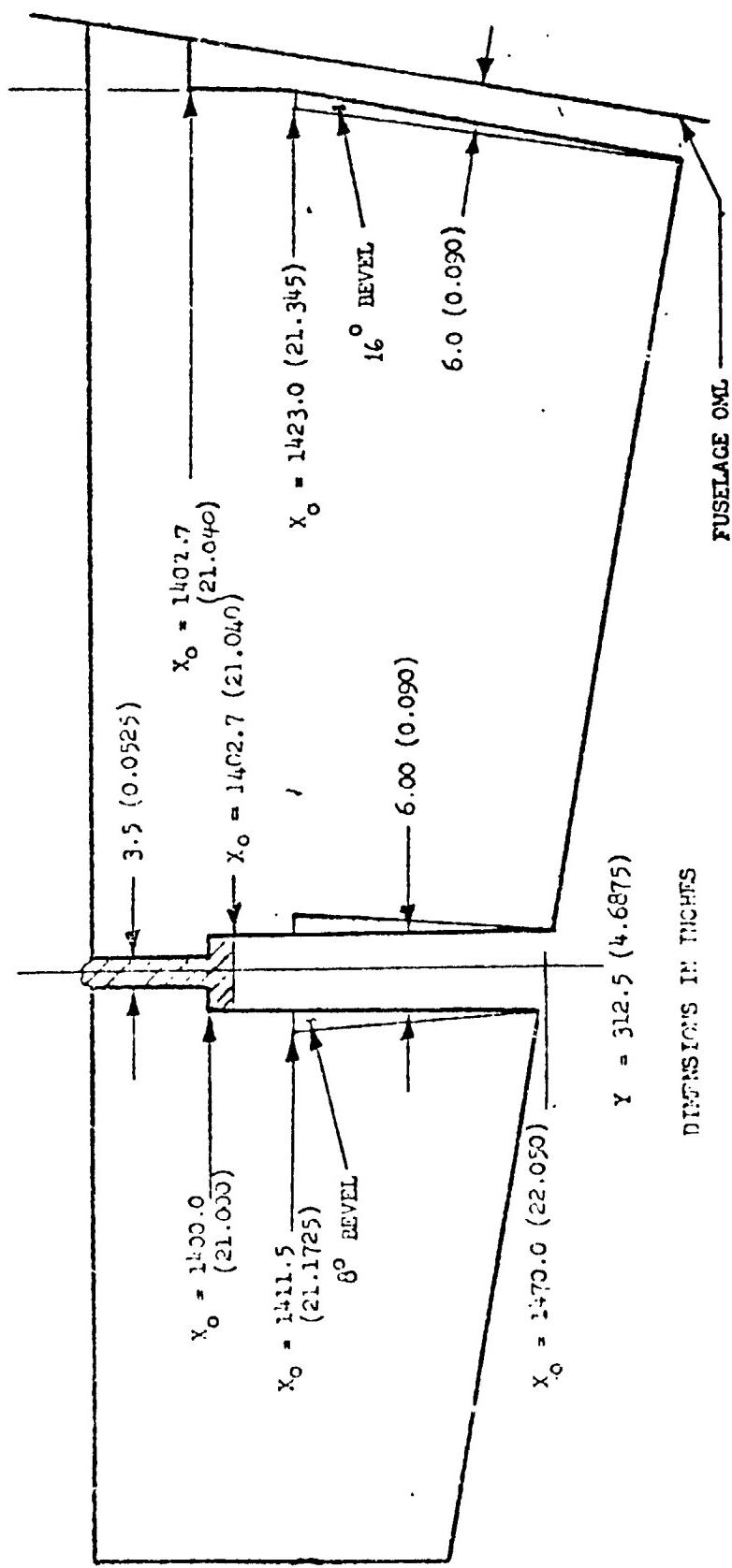


FIGURE 1. - AXIS SYSTEMS



a. SSV Orbiter Configuration  
Figure 2. - Model Sketches

$Y = 128.50$  (1.928)



DIMENSIONS IN INCHES

- b. Slotted Elevon E43 (6-inch gap)  
Figure 2. - Concluded.



a. Orbiter Configuration, Front, 3/4 View  
Figure 3. - Model Photographs

REPRODUCED FROM THE  
ORIGINAL AS RECEIVED



b. Orbiter Configuration, Rear, 3/4 View  
Figure 3. - Continued



c. View of Elevon Drive Motors  
Figure 3. - Concluded

DATA FIGURES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ELV-L0	ELV-L1	ELV-R1	ELV-R0
R4001	LA-19 SPWT 1101 RI-0898/139 ORB SP-LT ELEVON	.000	-10.000	.000	.000
R4005	LA-19 SPWT 1101 RI-0898/139 ORB SP-LT ELEVON	-10.000	-10.000	-10.000	-10.000
R4006	LA-19 SPWT 1101 RI-0898/139 ORB SP-LT ELEVON	-20.000	-20.000	-20.000	-20.000
R4007	LA-19 SPWT 1101 RI-0898/139 ORB SP-LT ELEVON	-40.000	-40.000	-40.000	-40.000

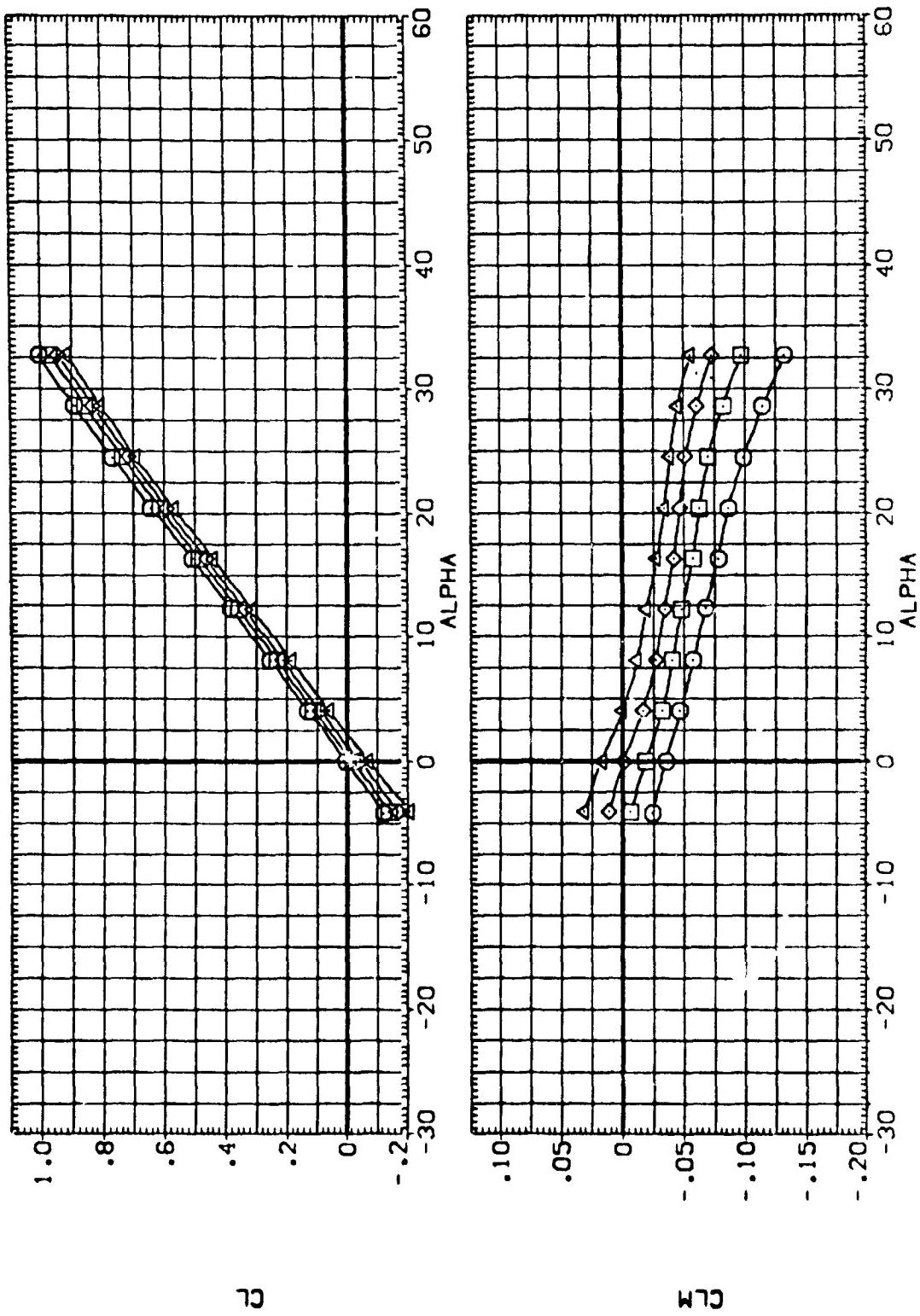
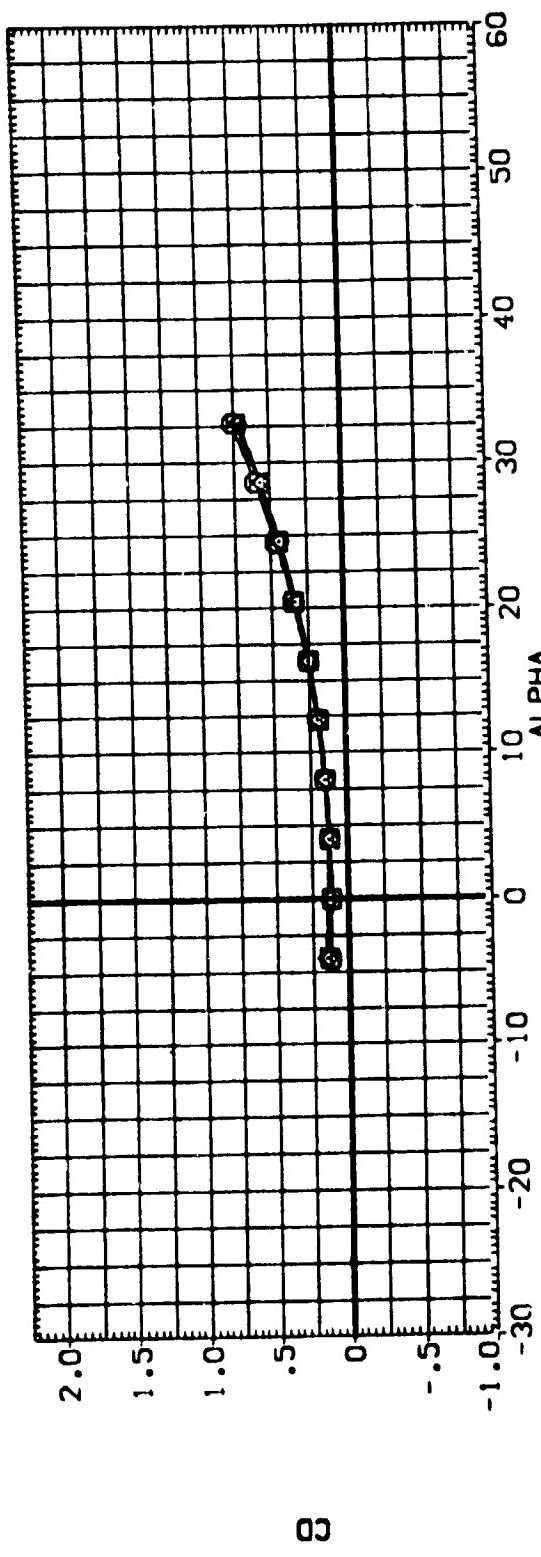


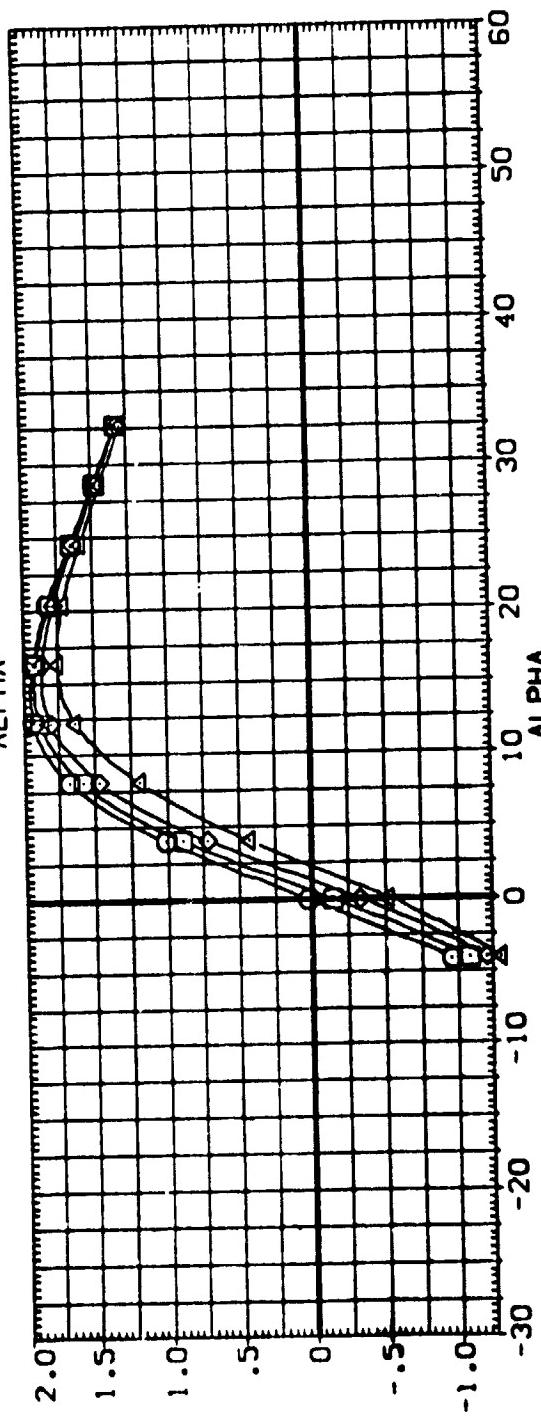
FIGURE 4. FULL SPAN ELEVON PITCH CHARACTERISTICS  
 $(A)_WACH = 2.50$

DATA SET SYMBOL      CONFIGURATION DESCRIPTION      ELV-L0      ELV-L1      ELV-RI      ELV-R0

LA-49 SPN1	101 RI-08881/39	088 SPLIT ELEVON	-10.000	-10.000	-10.000	-10.000
LA-49 SPN1	101 RI-08881/38	088 SPLIT ELEVON	-20.000	-20.000	-20.000	-20.000
LA-49 SPN1	101 RI-08881/37	088 SPLIT ELEVON	-40.000	-40.000	-40.000	-40.000
LA-49 SPN1	101 RI-08881/39	088 SPLIT ELEVON				



C<sub>L</sub>



C<sub>L</sub>/D

FIGURE 4. FULL SPAN ELEVON PITCH CHARACTERISTICS  
( $\lambda$ )MACH = 2.50

PAGE 2

DATA SET SYMBOL	CONFIGURATION	DESCRIPTION	ELEV-LD	ELEV-LI	ELEV-RI	ELV-RD
LA-49	LA-49	RI-0088/ 39 058 50.1 ELEV	00.	000	000	000
LA-49	LA-49	RI-0089/ 39 058 50.1 ELEV	-10.	000	-10.000	-10.000
LA-49	LA-49	RI-0087/ 39 058 50.1 ELEV	-20.	000	-20.000	-20.000
LA-49	LA-49	RI-0088/ 39 058 50.1 ELEV	-40.	000	-40.000	-40.000

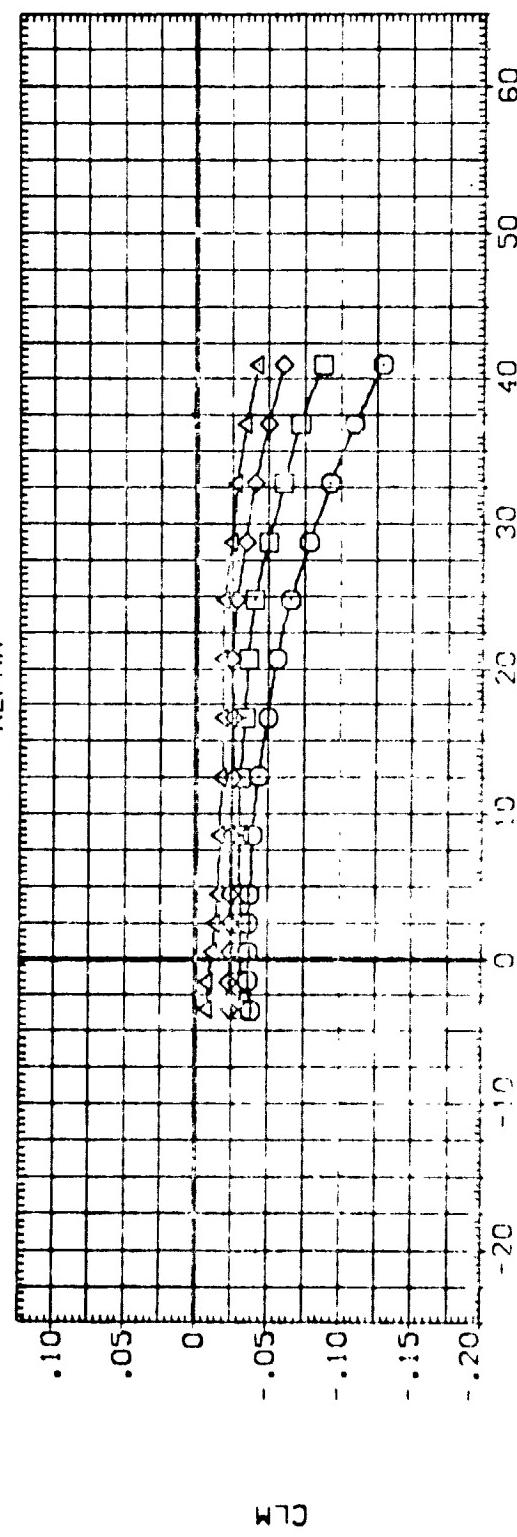
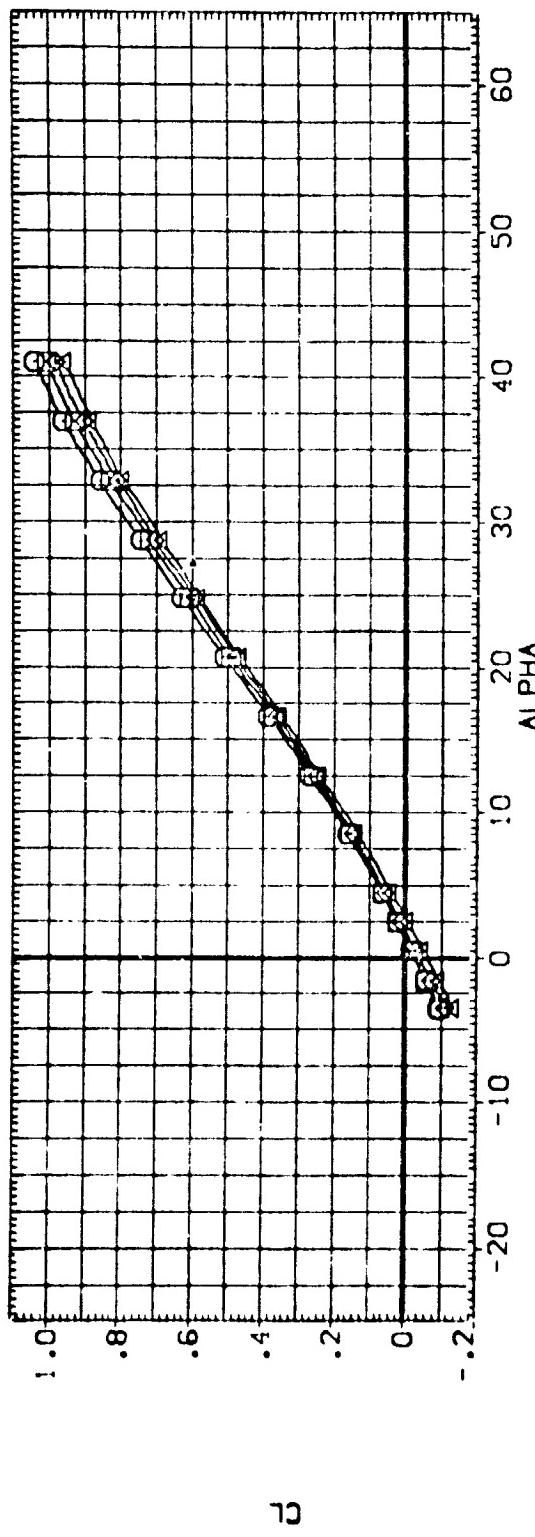


FIGURE 4. FULL SPAN ELEVON PITCH CHARACTERISTICS

460

DATA SET SPAN CONFIGURATION DESCRIPTION  
 LA-49 SPN 1101 RI-0698/139 089 SA-11 ELEVON  
 LA-49 SPN 1101 RI-0698/139 098 SA-11 ELEVON  
 LA-49 SPN 1101 RI-0698/139 098 SA-11 ELEVON  
 LA-49 SPN 1101 RI-0698/139 088 SA-11 ELEVON

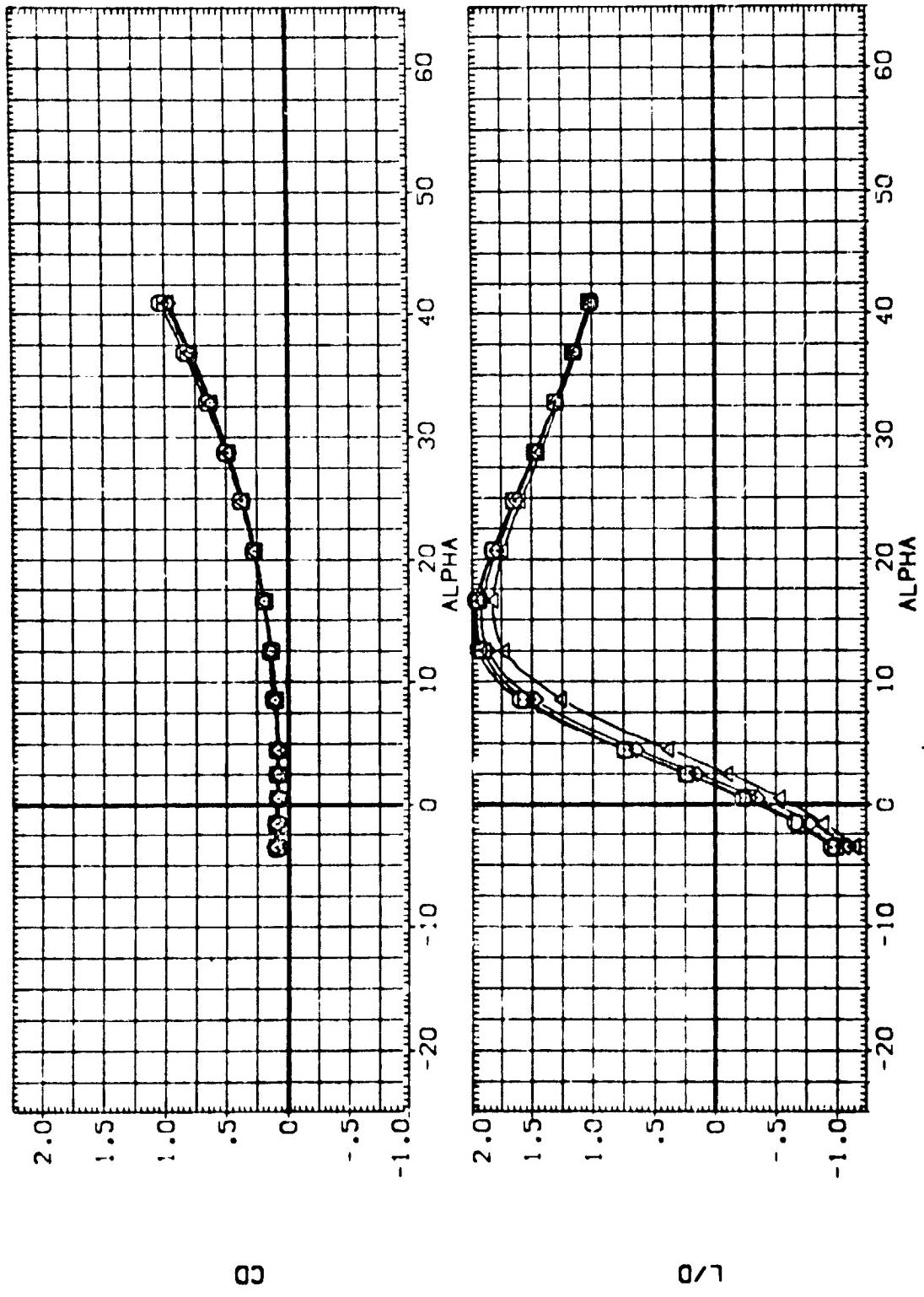


FIGURE 4. FULL SPAN ELEVON PITCH CHARACTERISTICS  
 $(B)MACH = 4.60$

DATA SET SYMBOL	CONFIGURATION	DESCRIPTION	ELEV-L0	ELEV-L1	ELEV-R0	ELEV-R1
R-001	L-49 SP-1	R1-0098/39 088 SP-11 ELEVON	.000	-40.000	-40.000	.000
R-002	L-49 SP-1	R1-0098/39 088 SP-11 ELEVON	.000	-20.000	-20.000	.000
R-003	L-49 SP-1	R1-0098/39 088 SP-11 ELEVON	.000	-10.000	-10.000	.000
R-004	L-49 SP-1	R1-0098/39 088 SP-11 ELEVON	.000	.000	.000	.000

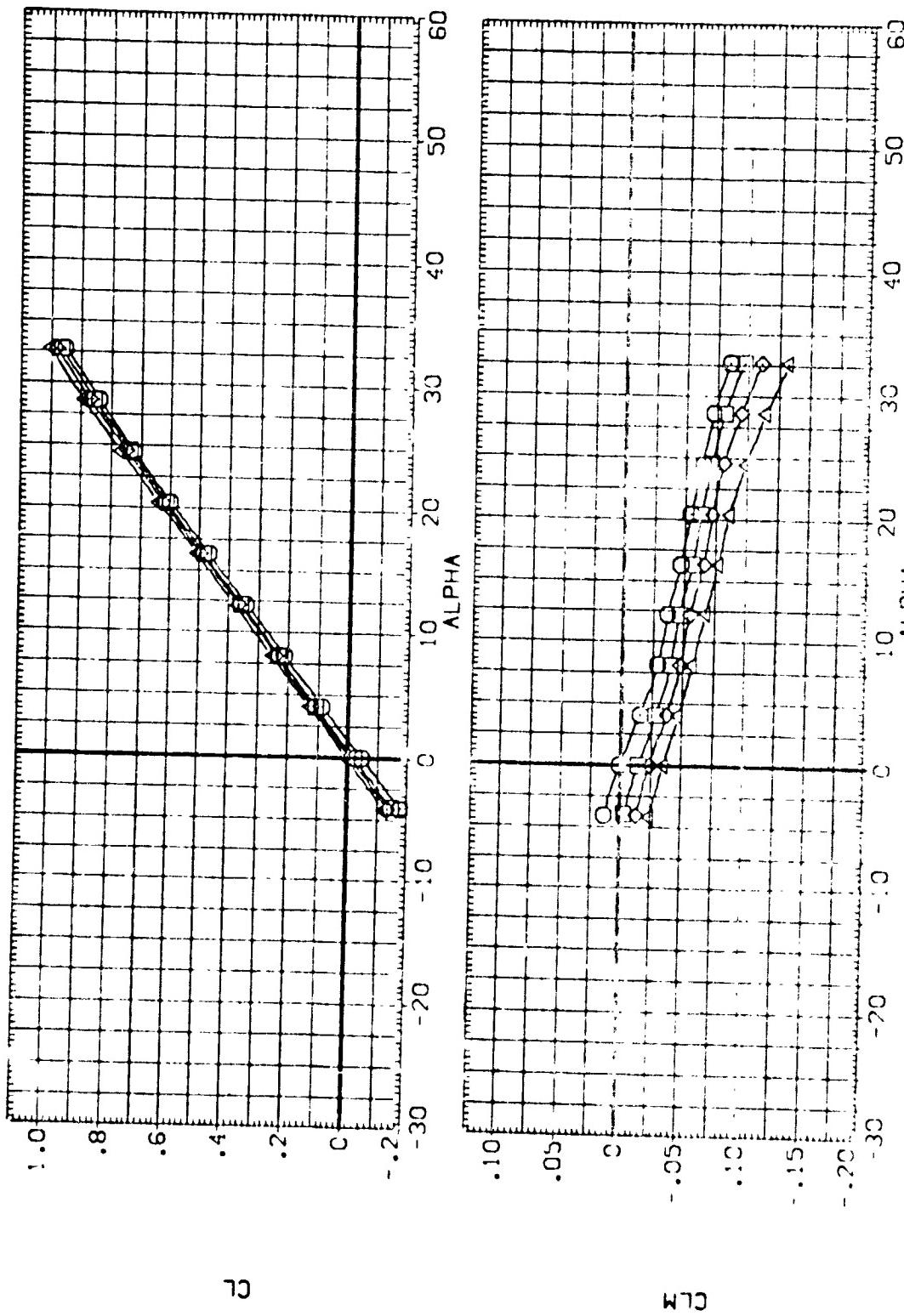


FIGURE 5. INBOARD ELEVON PITCH CHARACTERISTICS  
CLMACH = 2.5°

REPRODUCIBILITY OF THE  
ORIGINAL PLOT IS POOR

DATA SET SWBQ CONFIGURATION DESCRIPTION  
A-19 UP RI-0688/138 688 SP.11 ELEVON  
A-19 SP RI-0688/138 688 SP.11 ELEVON

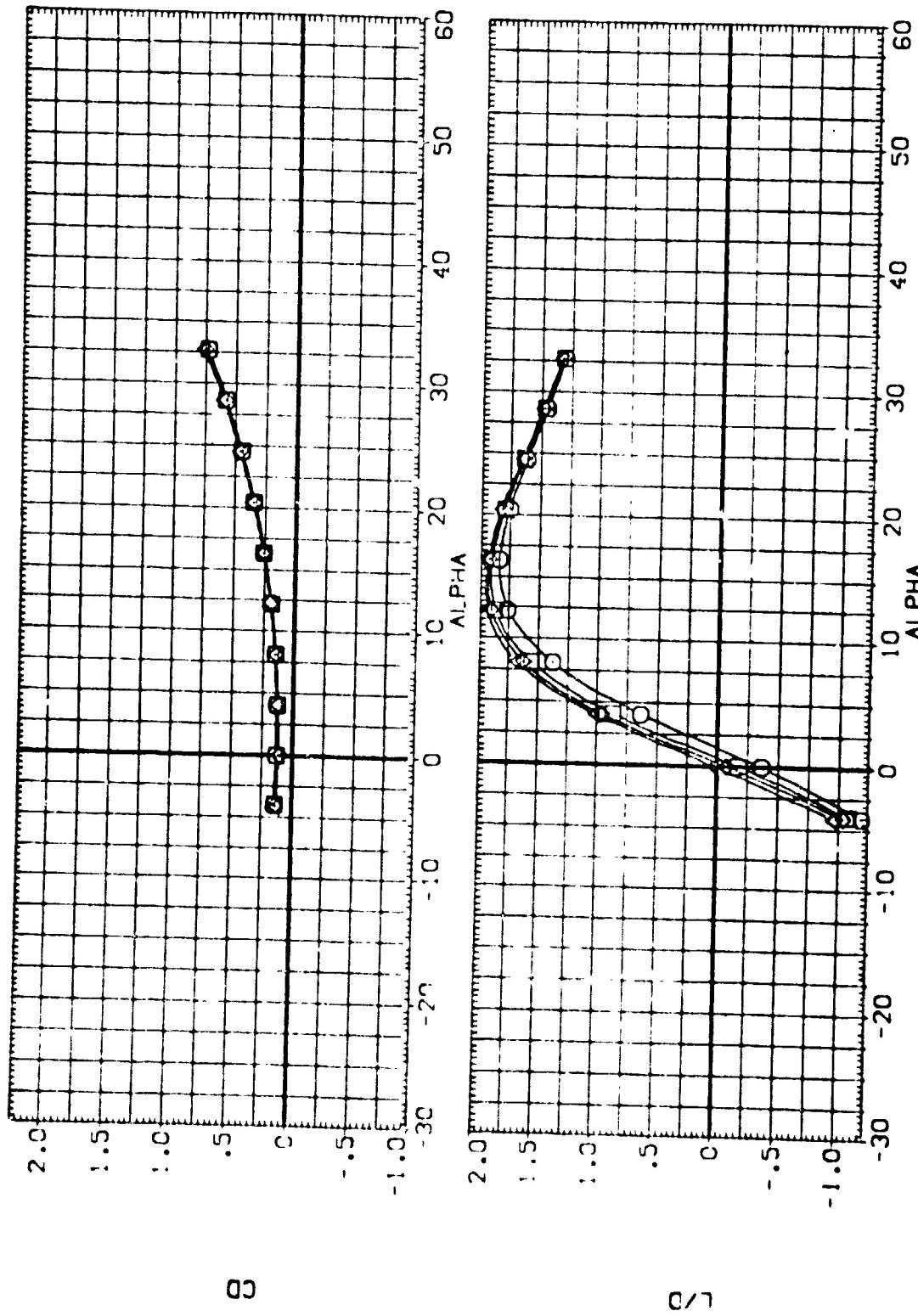


FIGURE 5. INBOARD ELEVON PITCH CHARACTERISTICS  
( $\alpha_{MACH} = 2.50$ )

ELV-L0	ELV-L1	ELV-R1	ELV-R0
.000	-10,000	-40,000	.000
.000	-20,000	-20,000	.000
.000	-10,000	-10,000	.000
.000	.000	.000	.000

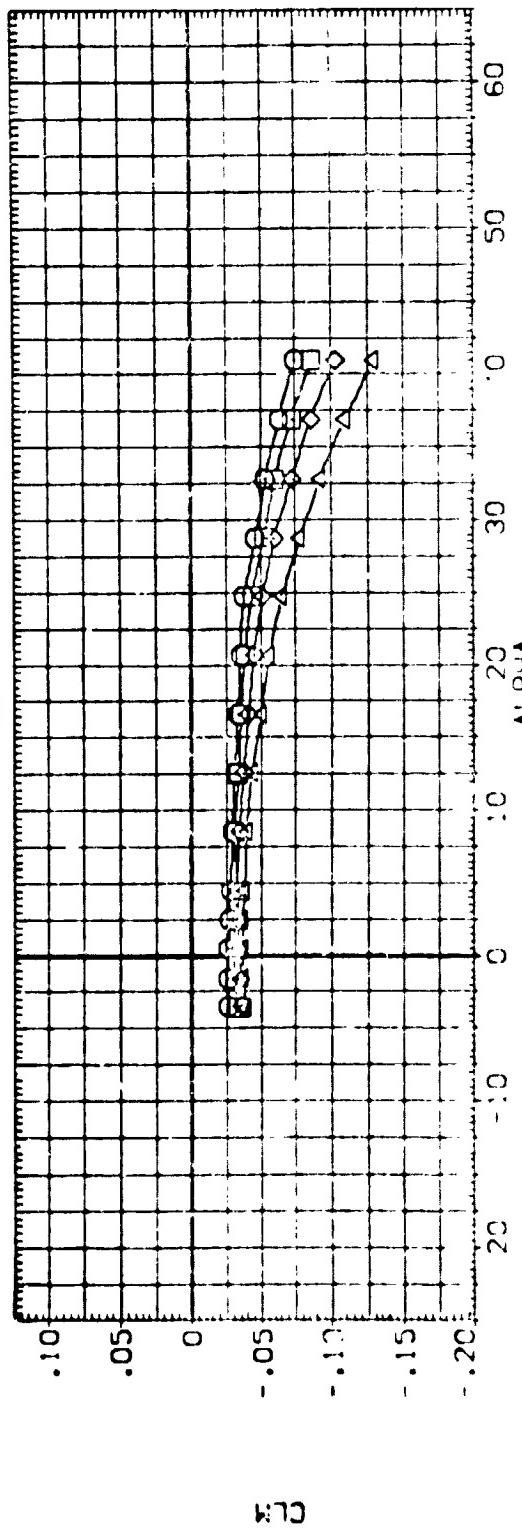
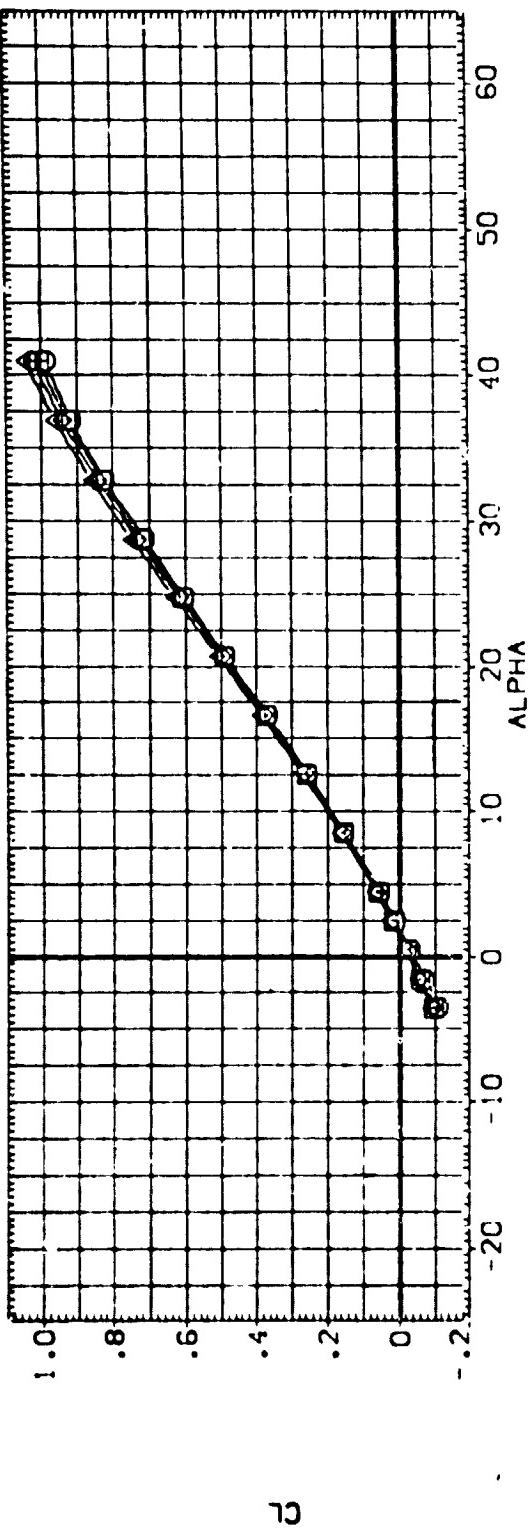


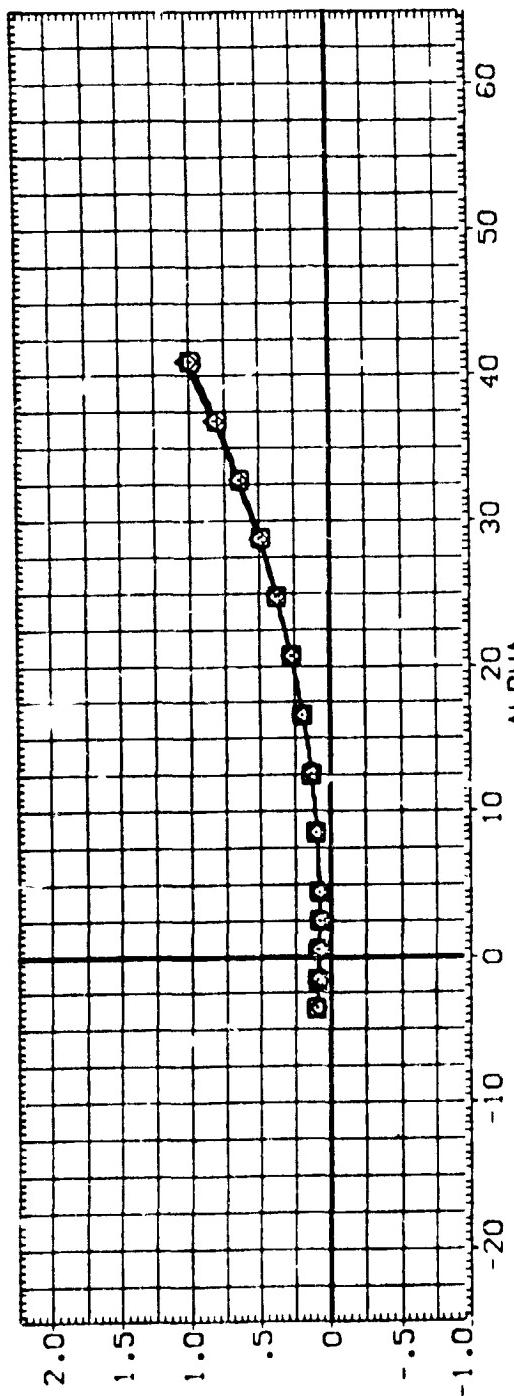
FIGURE 5. INRCARD ELEVN PITCH CHARACTERISTICS

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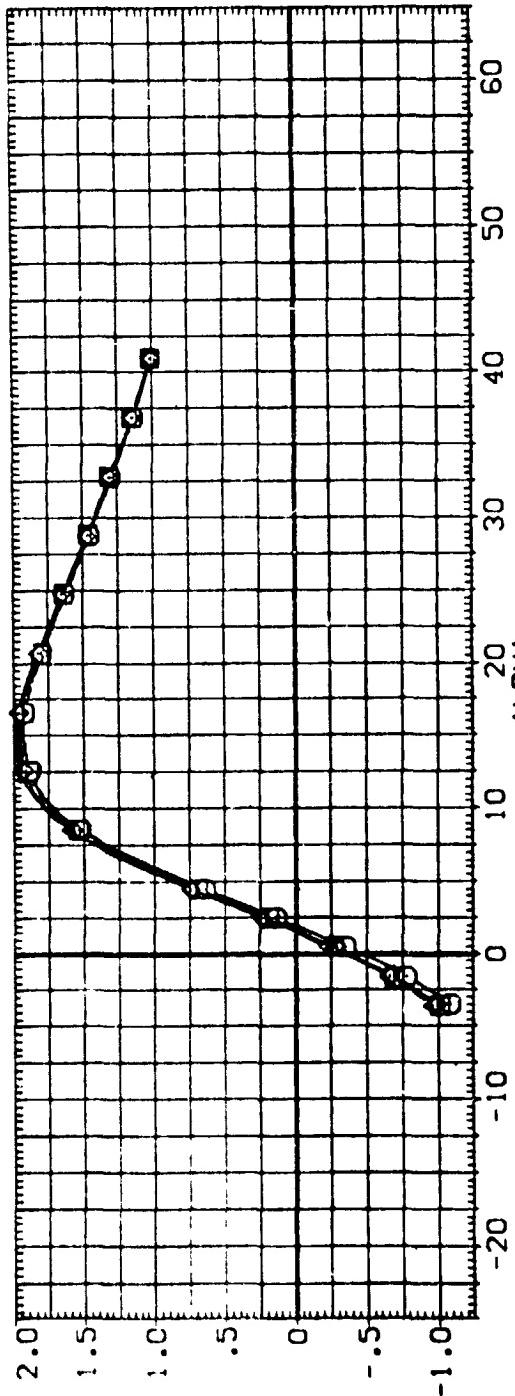
PAGE 7

DATA SET SYMBOL CONFIGURATION DESCRIPTION

	ELV-LG	ELV-LI	ELV-RI	ELV-RD
RW004	101	RI-0888/139	088 SPLIT ELEVON	.000 -10.000 -40.000 .000
RW003	101	RI-0888/139	088 SPLIT ELEVON	.000 -20.000 -20.000 .000
RW002	101	RI-0888/139	088 SPLIT ELEVON	.000 -10.000 -10.000 .000
RW001	101	RI-0888/139	088 SPLIT ELEVON	.000 .000 .000 .000



CD



CD

FIGURE 5. INBOARD ELEVON PITCH CHARACTERISTICS  
 $(B)MACH = 4.60$

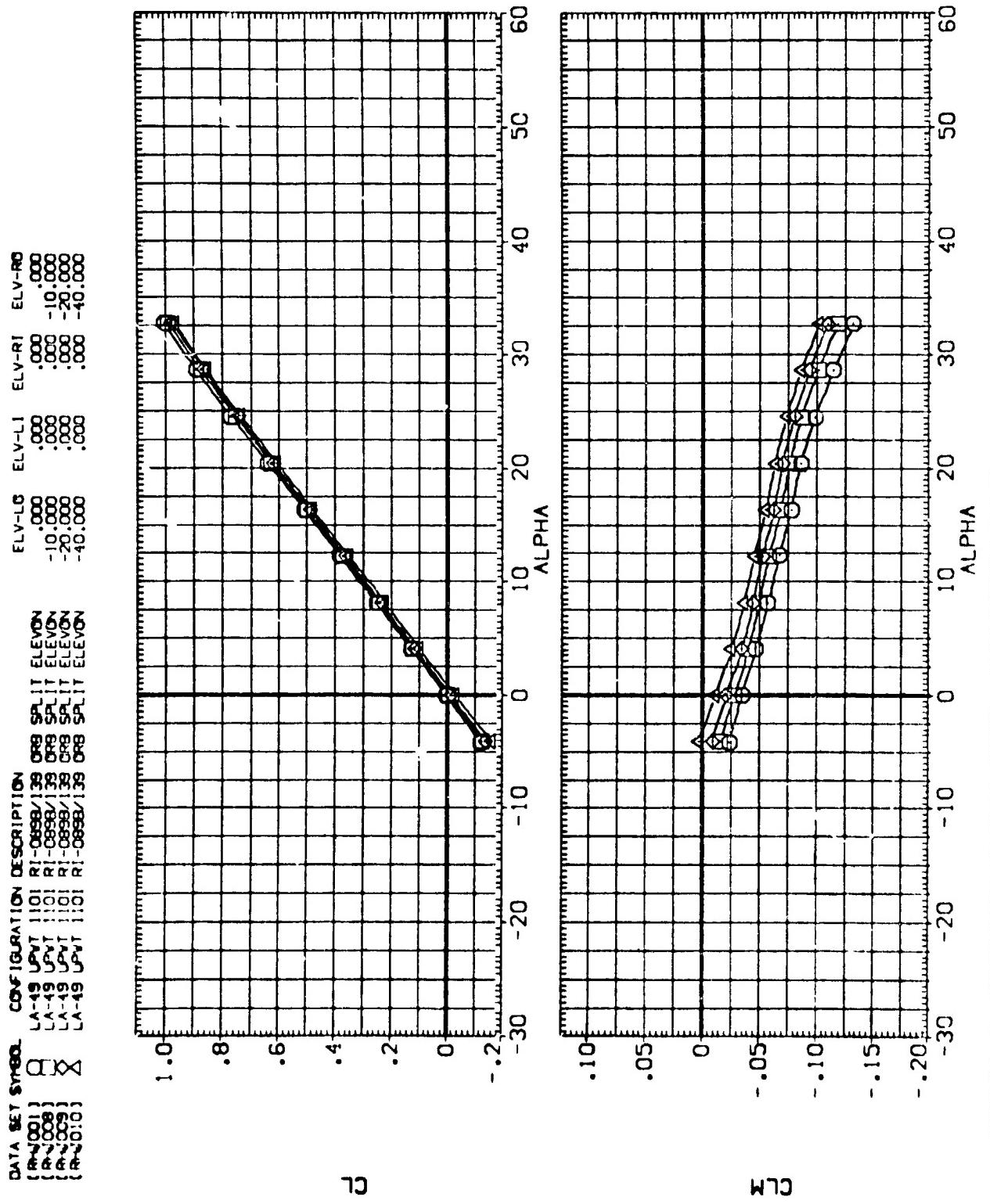
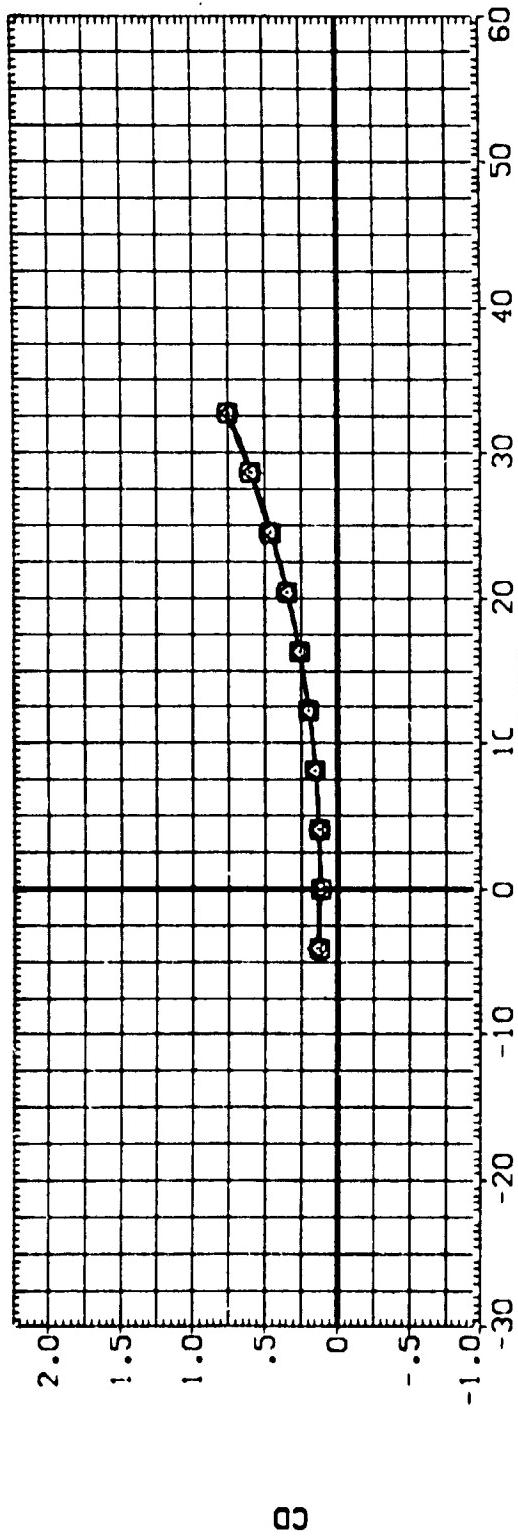


FIGURE 6. OUTBOARD ELEVON PITCH CHARACTERISTICS

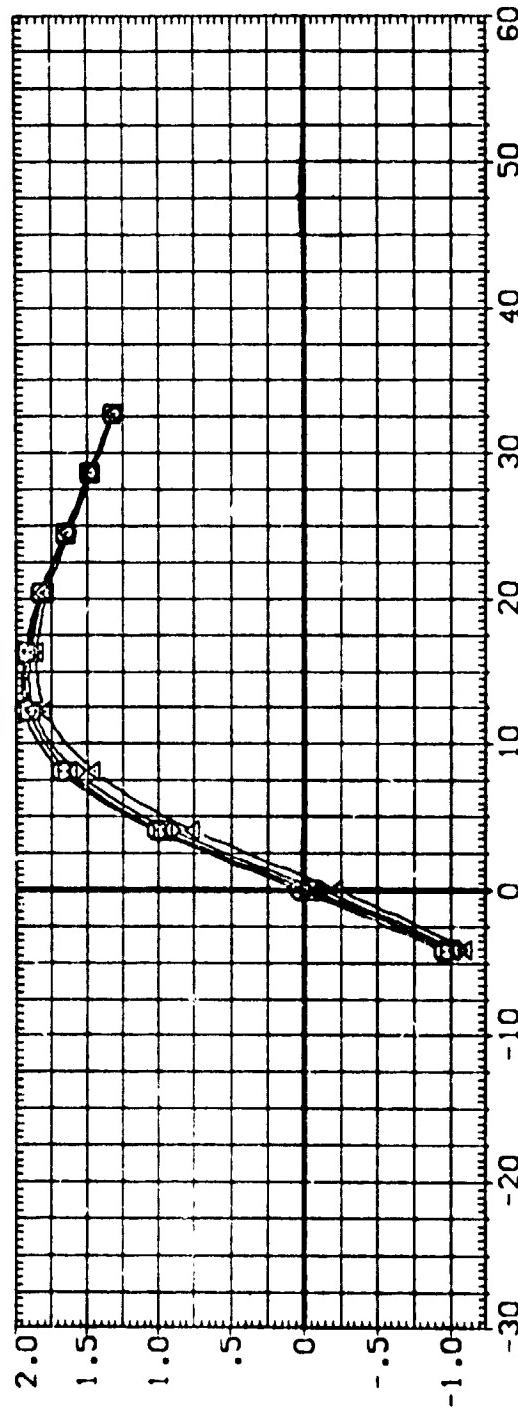
$(\lambda)_{MACH} = 2.50$

DATA SET SYMBOL CONFIGURATION DESCRIPTION

	ELV-L0	ELV-R1	ELV-R0
LA-149 LIFT	.101	R1-.0898/.139	088 SPLIT ELEVON
LA-149 RIFT	.101	R1-.0898/.139	088 SPLIT ELEVON
LA-149 SIFT	.101	R1-.0898/.139	088 SPLIT ELEVON
LA-149 STIFT	.101	R1-.0898/.139	088 SPLIT ELEVON
LA-149 UIFT	.101	R1-.0898/.139	088 SPLIT ELEVON



$C_g$



$L/D$

FIGURE 6. OUTBOARD ELEVON PITCH CHARACTERISTICS  
 $(\text{MACH} = 2.50)$

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ELV-L0	ELV-L1	ELV-R1	ELV-R0				
[RJU001]	LA-49 UPNT	1101	R1-0898/135	098	SPLIT ELEVON	.000	.000	.000	.000
[RJU008]	LA-49 UPNT	1101	R1-0898/135	098	SPLIT ELEVON	-10.000	.000	-10.000	.000
[RJU009]	LA-49 UPNT	1101	R1-0898/135	098	SPLIT ELEVON	-20.000	.000	-20.000	.000
[RJU010]	LA-49 UPNT	1101	R1-0898/135	098	SPLIT ELEVON	-40.000	.000	-40.000	.000

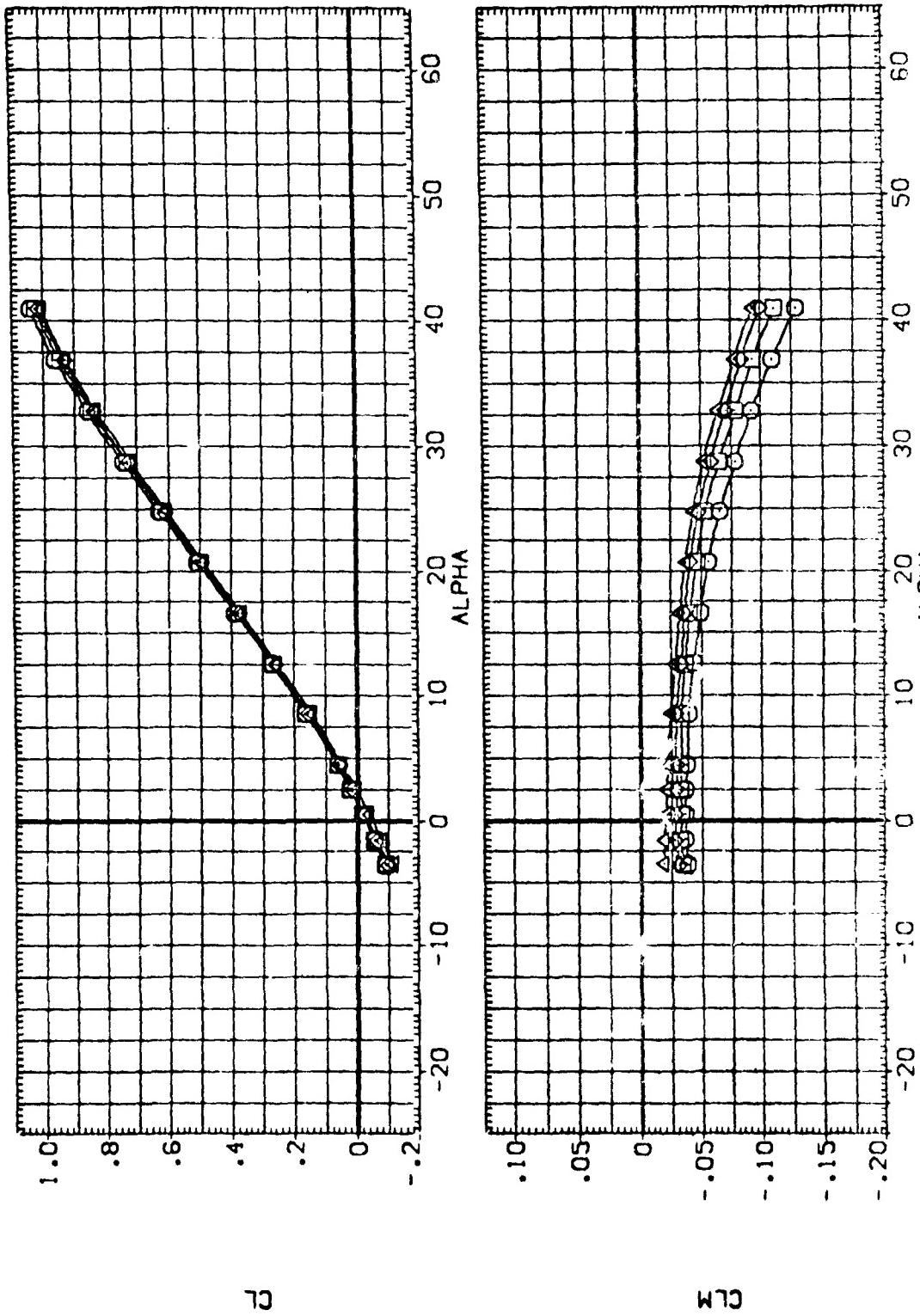


FIGURE 6. OUTBOARD ELEVON PITCH CHARACTERISTICS

(BOWMACH = 4.60)

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ELV-L0	ELV-L1	ELV-R1	ELV-R0
(1000)	LA-19 UNI R1-0898/138	.000	.000	.000	.000
(4700)	LA-19 UNI R1-0898/138	.000	.000	.000	-10.000
(4701)	LA-19 UNI R1-0898/138	.000	.000	.000	-20.000
(4702)	LA-19 UNI R1-0898/138	.000	.000	.000	-40.000

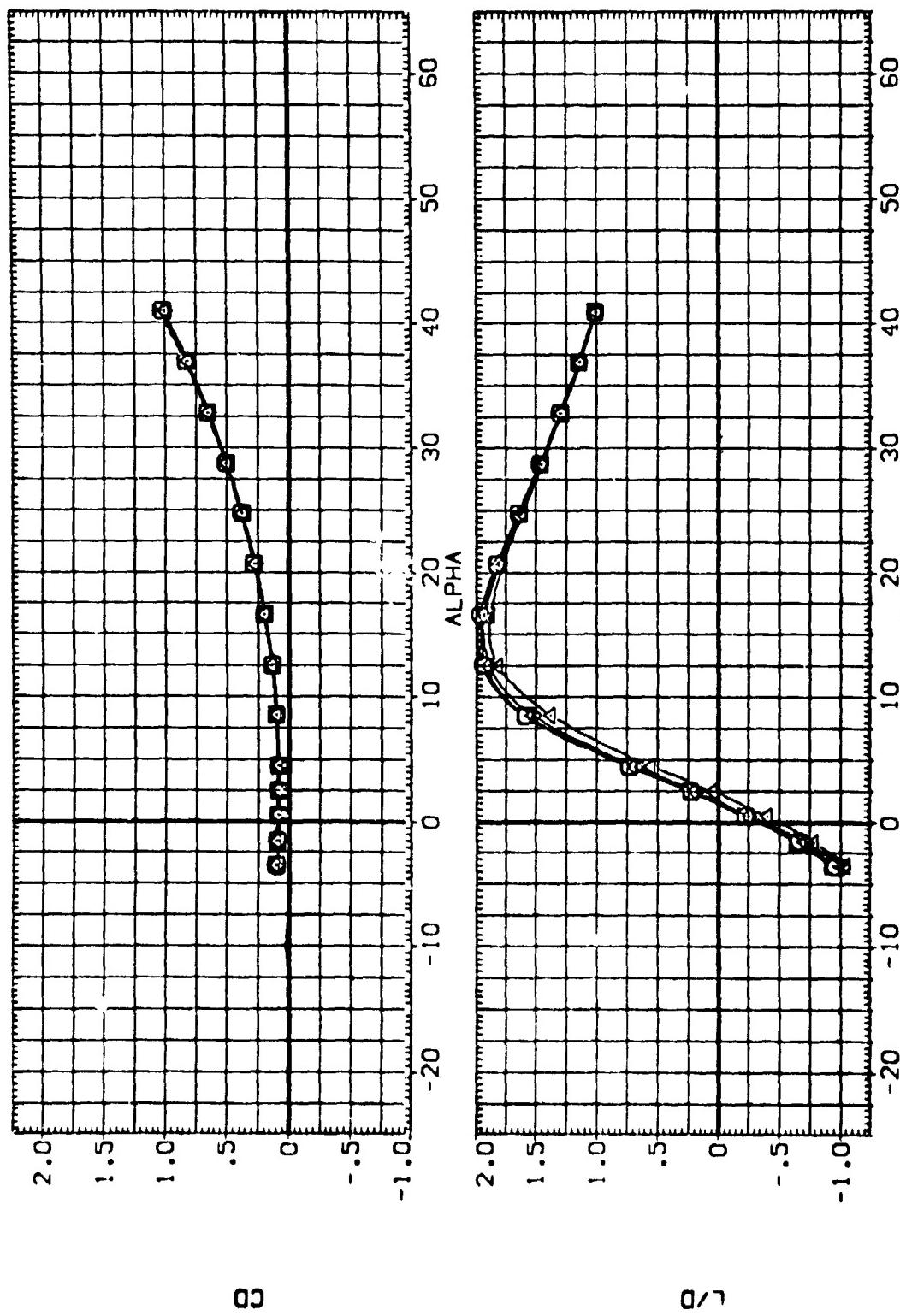
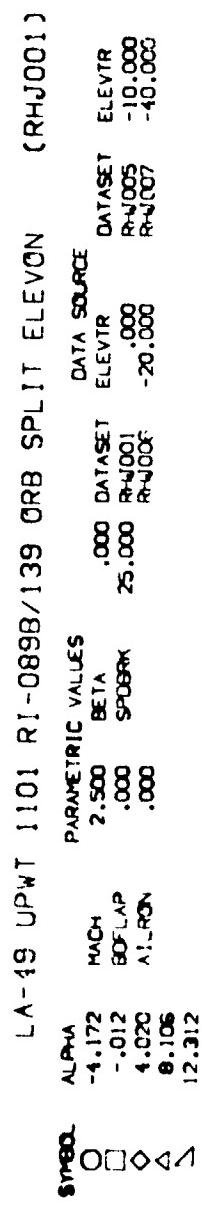


FIGURE 6. OUTBOARD ELEVON PITCH CHARACTERISTICS  
( $M_{MACH} = 4.60$ )



PITCHING MOMENT COEFFICIENT, CLM



FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

A-49 PWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)

Symbol	Alpha	Mach	Parametric Values	Beta	Dataset	Elevtr	Dataset	Elevtr
O	16.292	.000	.000	.000	RHJ001	.000	RHJ005	-10.000
U	20.438	.000	.000	.000	RHJ006	-20.000	RHJ007	-40.000
A	24.504	.000	.000	.000				
R	28.669	.000	.000	.000				
V	32.717	.000	.000	.000				

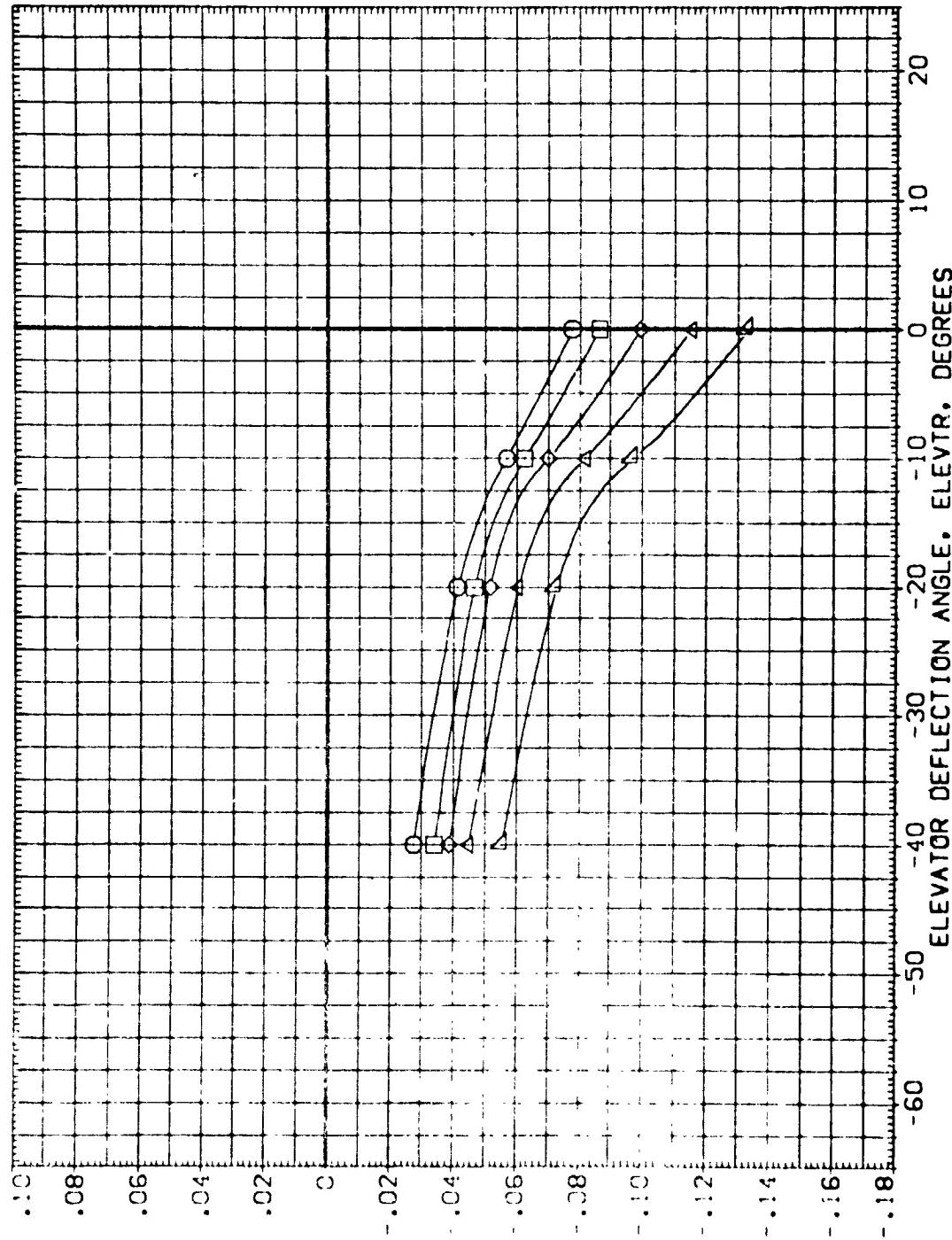


FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

PAGE 14

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)  
 SYMBOLS  
 ALPHA MACH 4.600 BETA .000 DATASET ELEVTR DATASET ELEVTR  
 -3.548 BOFLAP 25.000 RHJ001 RHJ005 RHJ005 -10.000  
 -1.553 ALRDN .000 RHJ006 RHJ007 -20.000 -40.000  
 .433 2.462 4.466

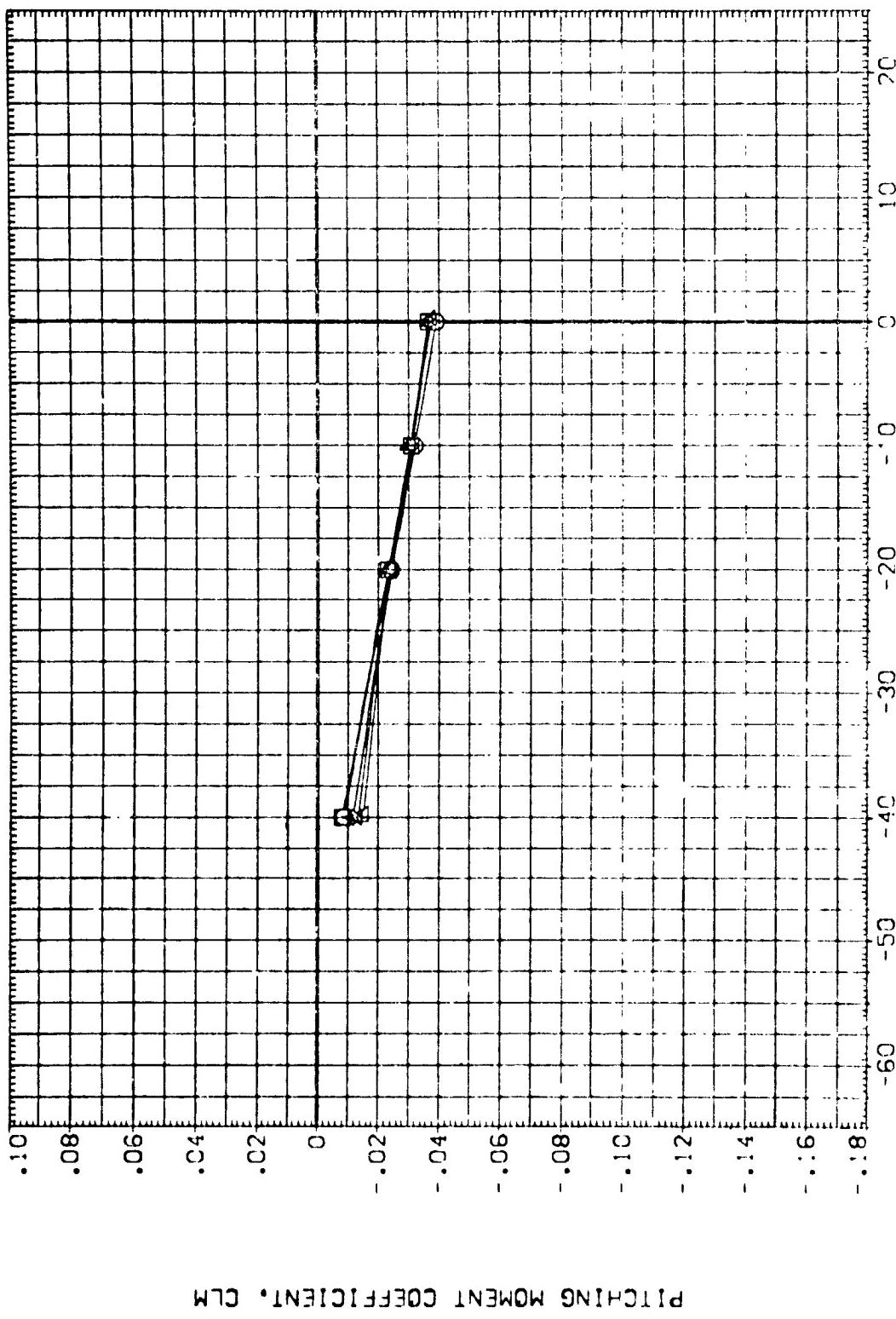


FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON [RHJ001]

	PARAMETRIC VALUES						
ALPHA	MACH	BETA	SPOKE	.000	DATASET	ELEVTR	
9.540	4.600	.000	25.000	RHJ001	-20.000	RHJ005	-10.000
12.575	BOFLAP	.000	RHJ006	RHJ007	RHJ005	RHJ007	-40.000
16.602	AIRRON	.000					
20.646							
24.715							

CLM 1044

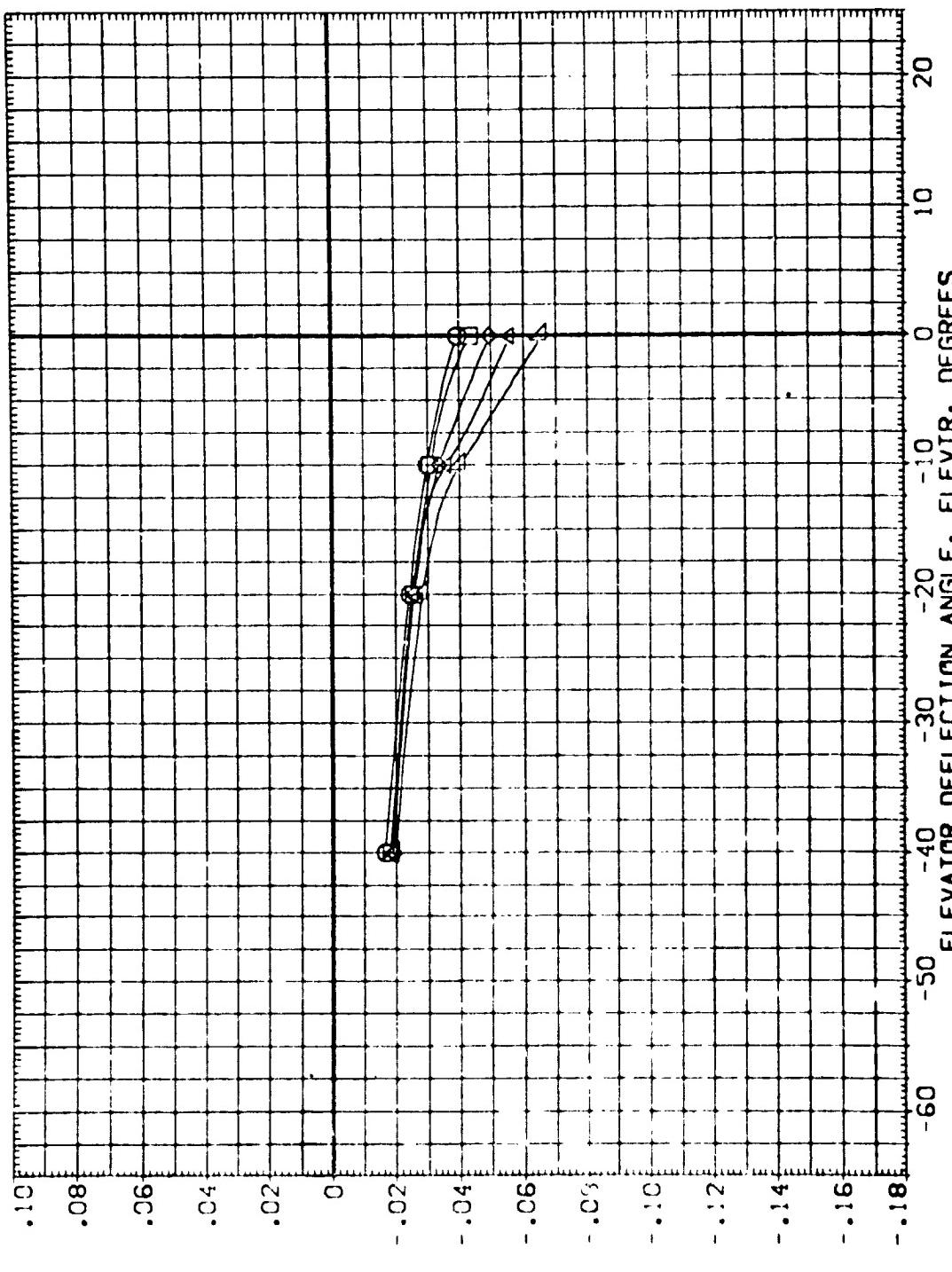
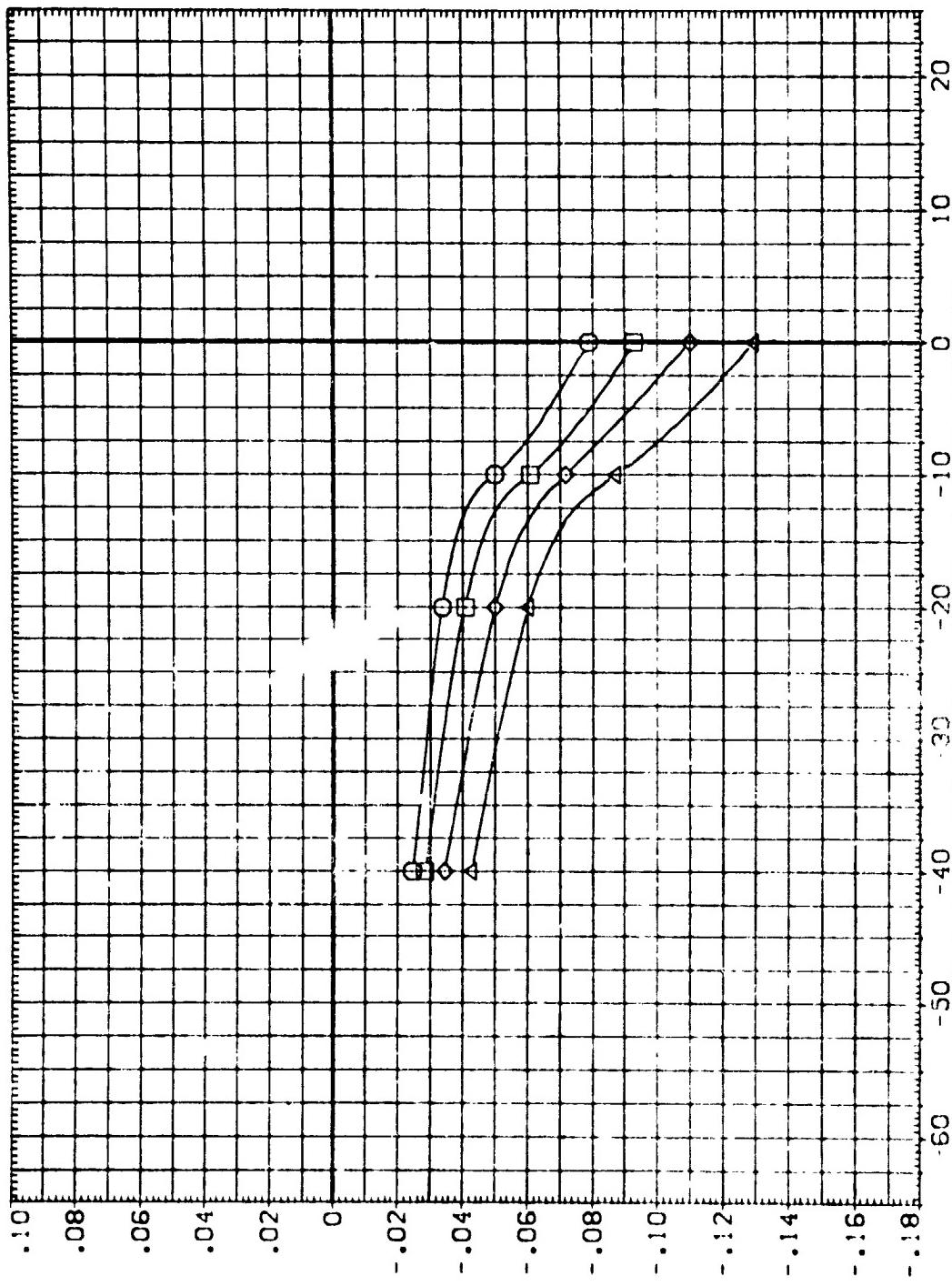


FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

PAGE 16

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)  
 ALPHA MACH .600 BETA .000 DATASET ELEVTR  
 28.780 .000 SP38K 75.000 RHJ001 .000 DATASET ELEVTR  
 32.804 BOFLAP .000 RHJ005 -.000 RHJ007 -.000  
 36.891 AIRRON .000 RHJ006 -.000 RHJ008 -.000  
 40.981

SOURCE: O □ ◇ △



PITCHING MOMENT COEFFICIENT, CLM

FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

A-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (BHJF01)

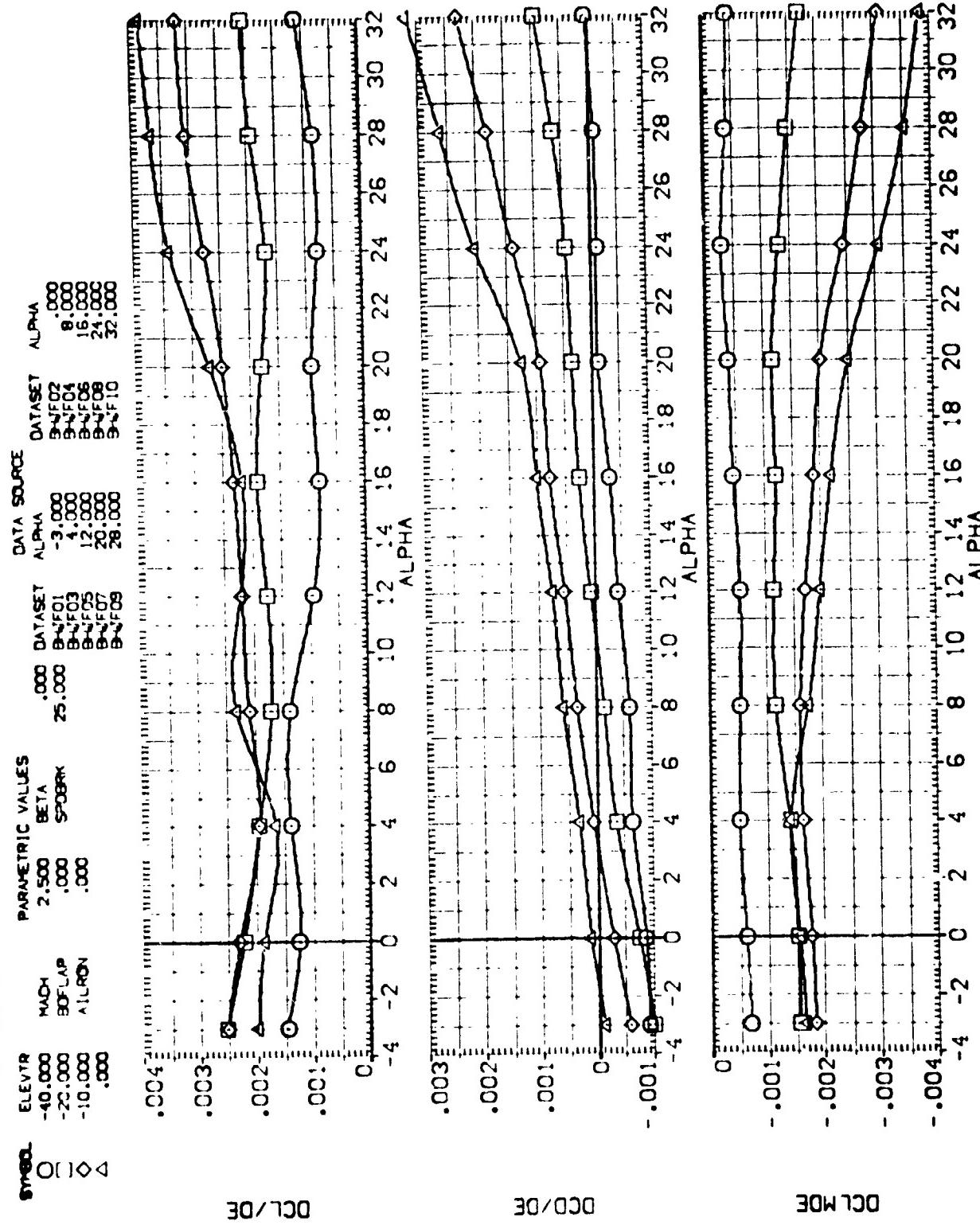


FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

PAGE 18

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (BHJF01)  
 ELEVATOR  
 MACH 4.630 BETA .000 DATASET ALPHA .000  
 BDFAP .000 SPBRK 25.000 DATASET ALPHA -.000  
 AIRDN .000 BDF01 -3.000 BDF02 .000  
 .000 BDF03 4.000 BDF04 .000  
 BDF05 12.000 BDF05 .000  
 BDF07 20.000 BDF06 8.000  
 BDF09 28.000 BDF08 16.000  
 BDF10 32.000

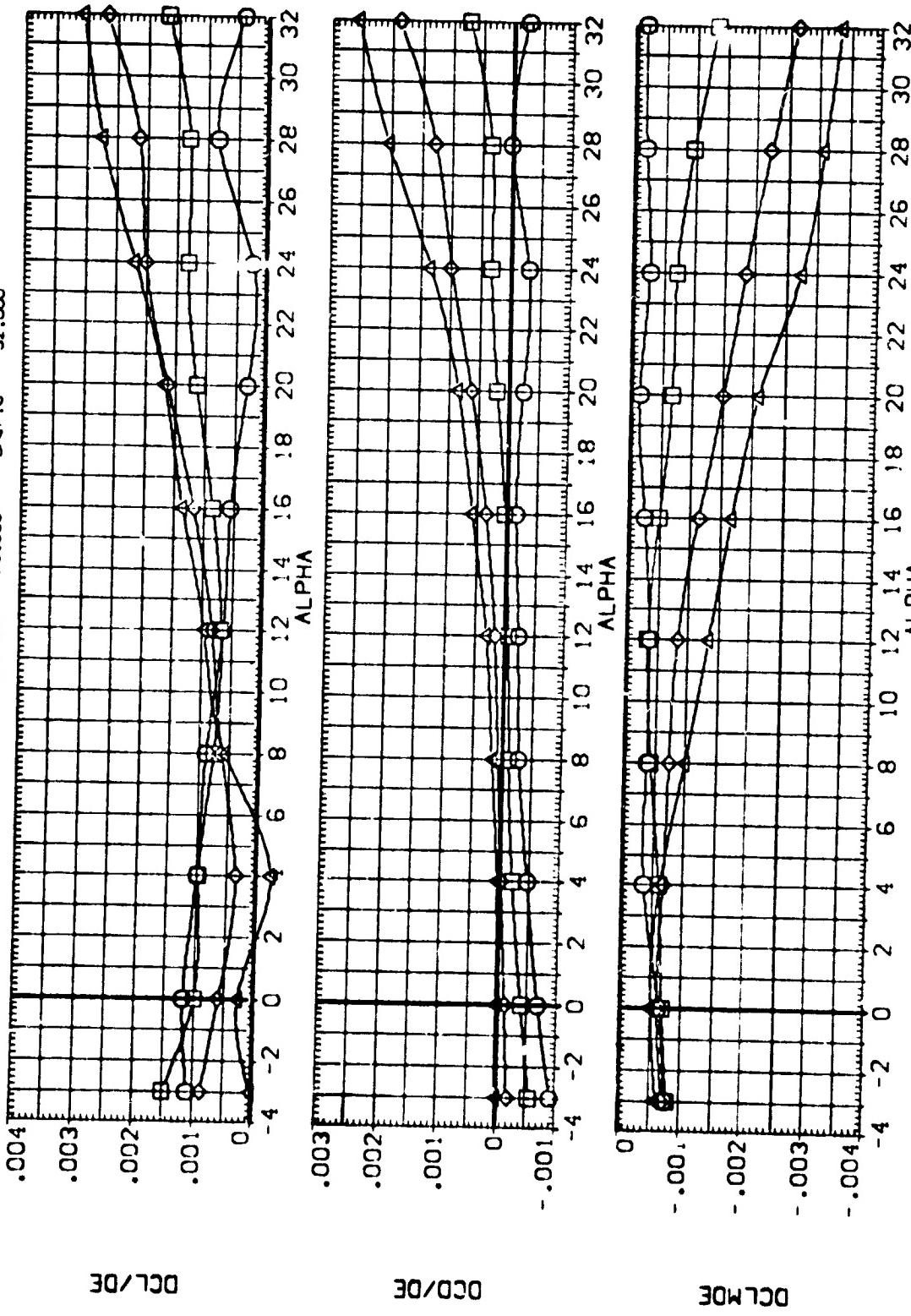
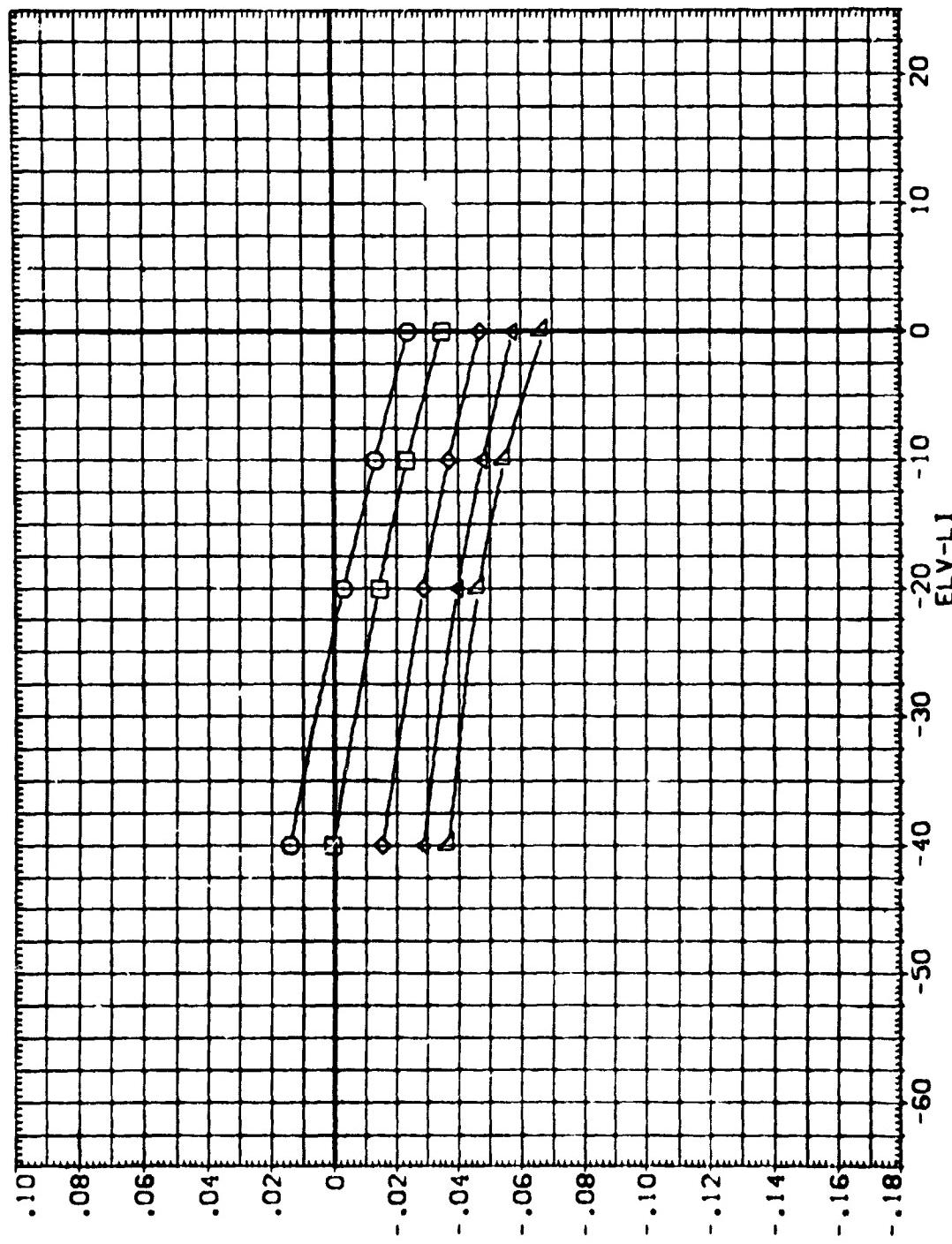


FIGURE 7. FULL SPAN ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ004)

ALPHA	PARAMETRIC VALUES	DATA SOURCE
-4.072	MACH .2500 ELV-LI .0000	.0000 RI-0004
-.004	ELV-RD .0000	.0000 RI-0002
4.082	BOFLAP .0000	25.0000 RI-0002
8.130	AIRDN .0000	
12.224		



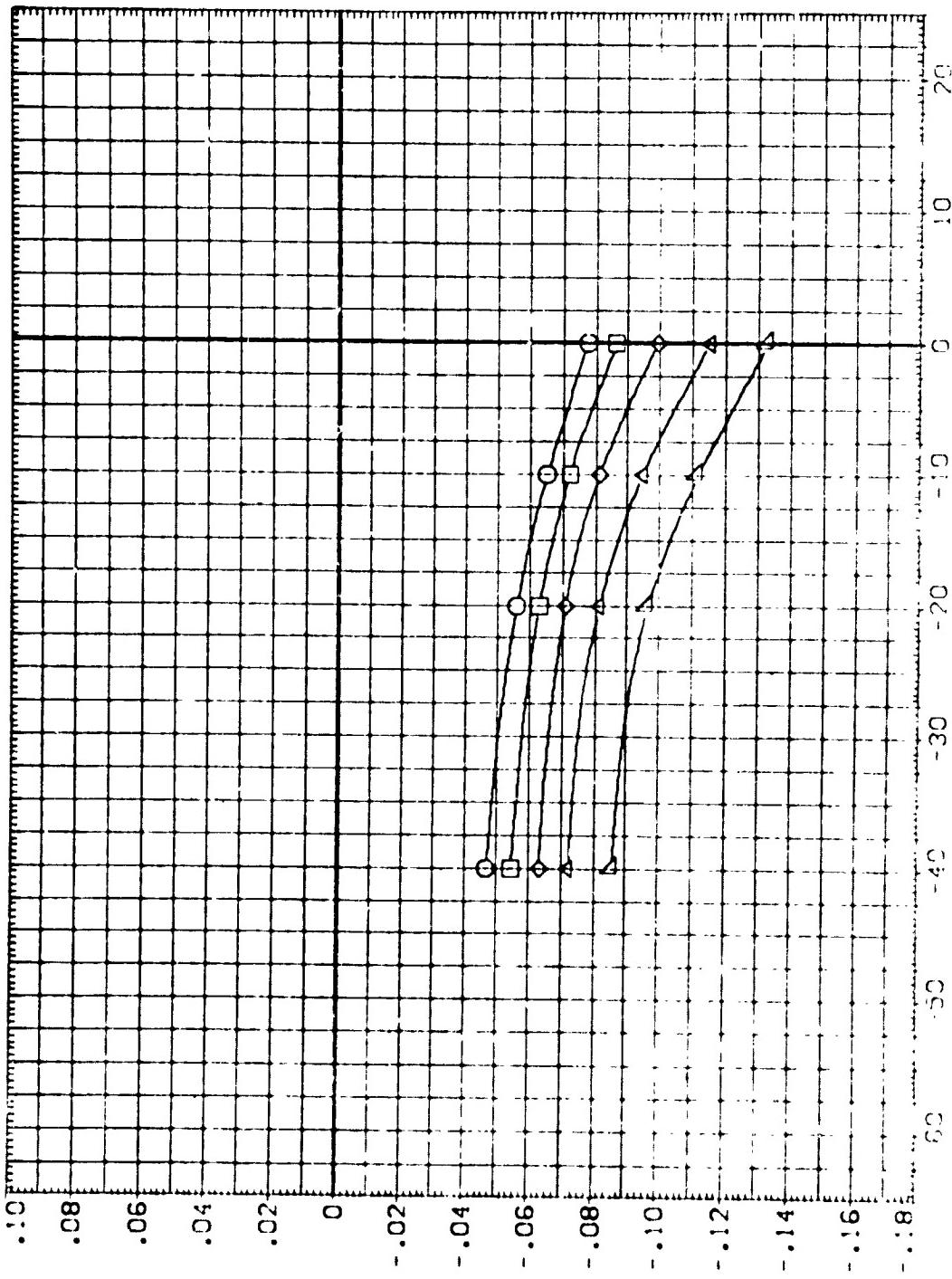
PITCHING MOMENT COEFFICIENT. CLM

**FIGURE 8: INBOARD ELEVON PITCH CONTROL EFFECTIVENESS**

PAGE 20

- A-49 UP&T 1101 RI-0893/139 ORB SPLIT ELEVON (RHJ004)

SIMUL	ALPHA	MACH	E_V	BETA	ELV-RO	SPDRX	PARAMETRIC VALUES	DATA SOURCE	DATASET
O	16.315	.0	.0	.000	.000	.000	.000	ELV-LI	ELV-LI
O	20.436	.0	.0	.000	.000	.000	.000	R-J003	R-J003
O	24.518	.0	.0	.000	.000	.000	.000	R-J001	R-J001
O	28.652	.0	.0	.000	.000	.000	.000	.000	.000
O	32.770	.0	.0	.000	.000	.000	.000	.000	.000



FITCHING MOMENT COEFFICIENT. CLM

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ004)

PARAMETRIC VALUES		DATA SOURCE	
		ELV-LI	ELV-LI
ALPHA	-3.524	MACH	.600
SYMBOL	○ □ ◇ ▲ △	ELV-L0	.000
	-1.576	ELV-R0	.000
	-.153	SP08R	25.000
	2.165	BOFLAP	.000
	1.194	AILRON	.000

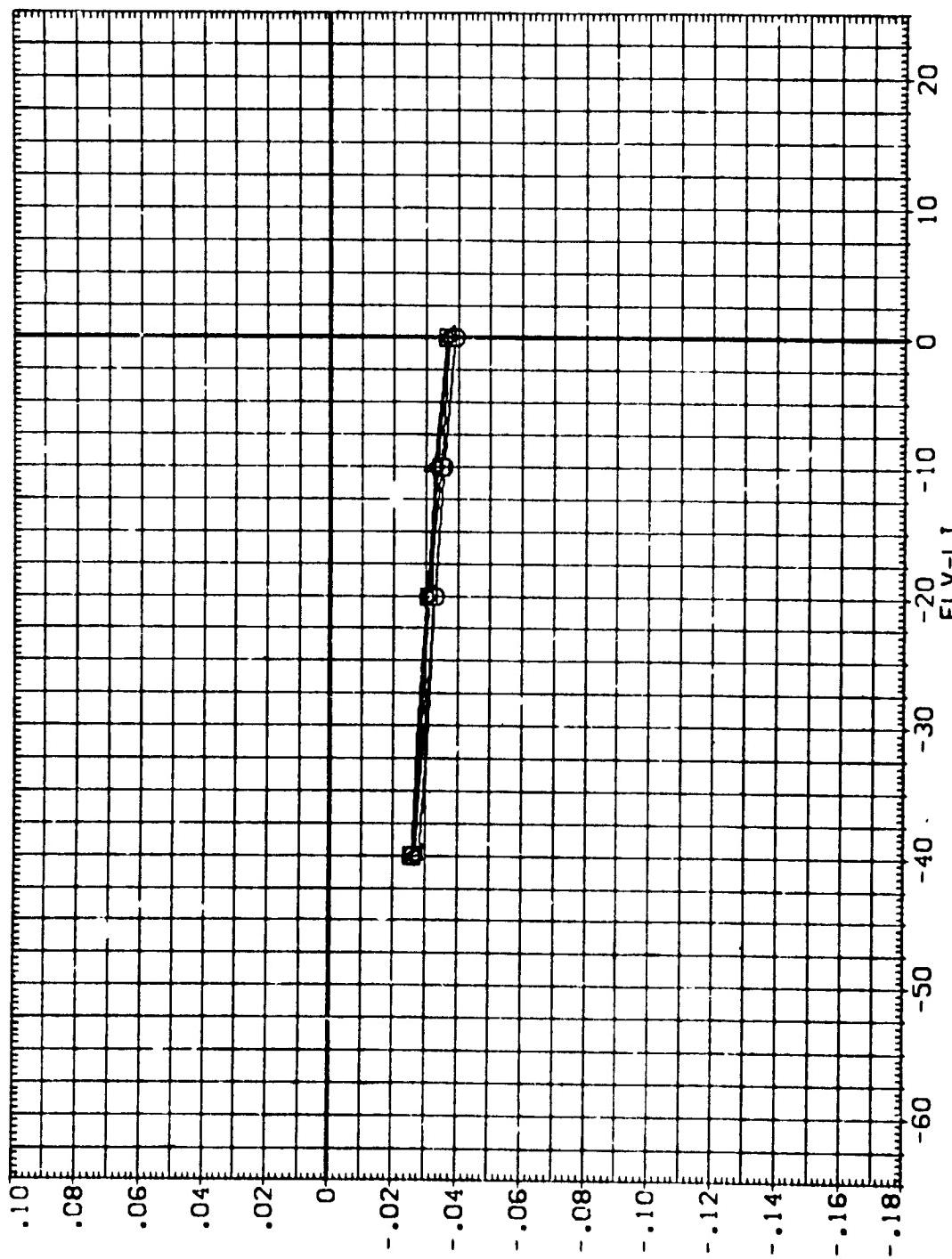


FIGURE 8. INBOARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ004)  
 DATA SOURCE  
 ALPHA MACH .4.600 BETA .000 DATASET ELV-L1  
 12.570 ELV-L0 .000 ELV-R0 .000 RHJ004 -10.000 RHJ003 -20.000  
 16.591 BDFLAP .000 SPDBRK 25.000 RHJ002 -10.000 RHJ001 .000  
 20.636 ALTRON .000  
 24.738

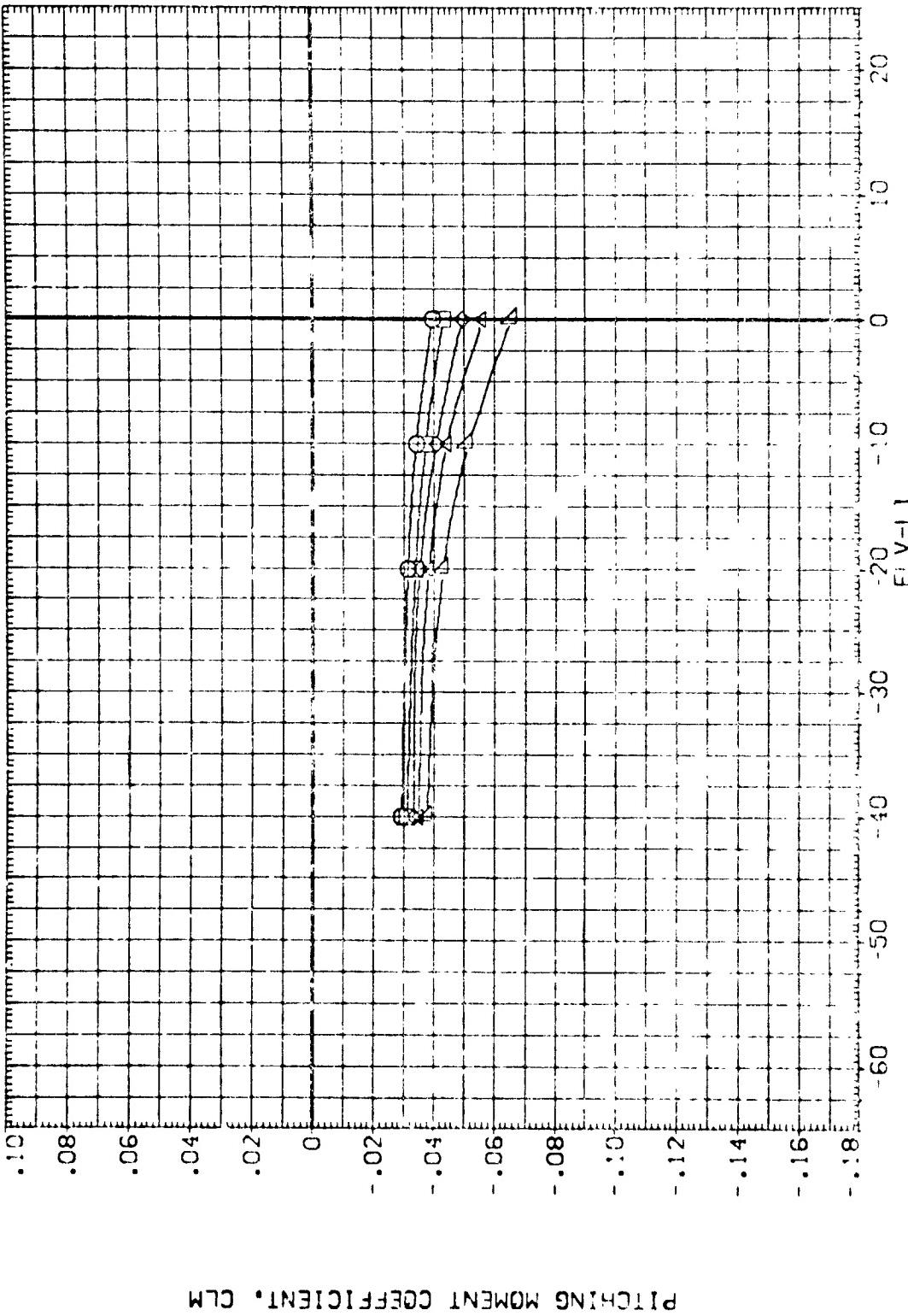


FIGURE 8, INBOARD FLOWN PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ004)  
 ALPHA MACH .600 PARAMETRIC VALUES  
 28.760 ELV-LI .000 DATASET ELV-LI  
 32.826 ELV-RD .000 DATASET ELV-RD  
 36.901 BDFLAP .000 DATASET RI-1003  
 40.956 AILRON .000 DATASET RI-1001

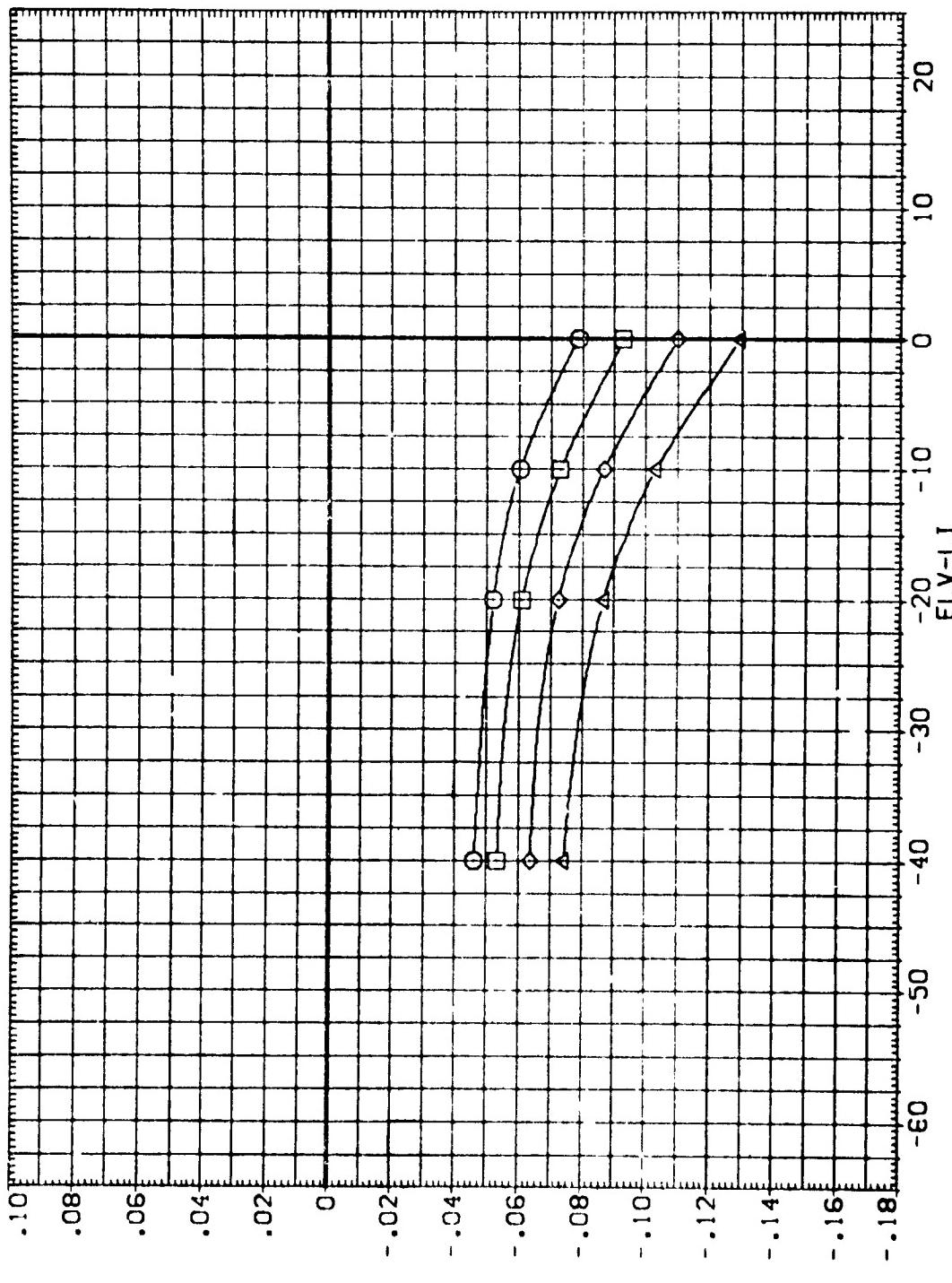


FIGURE 8. INBOARD ELEVON PITCH CONTROL EFFECTIVENESS

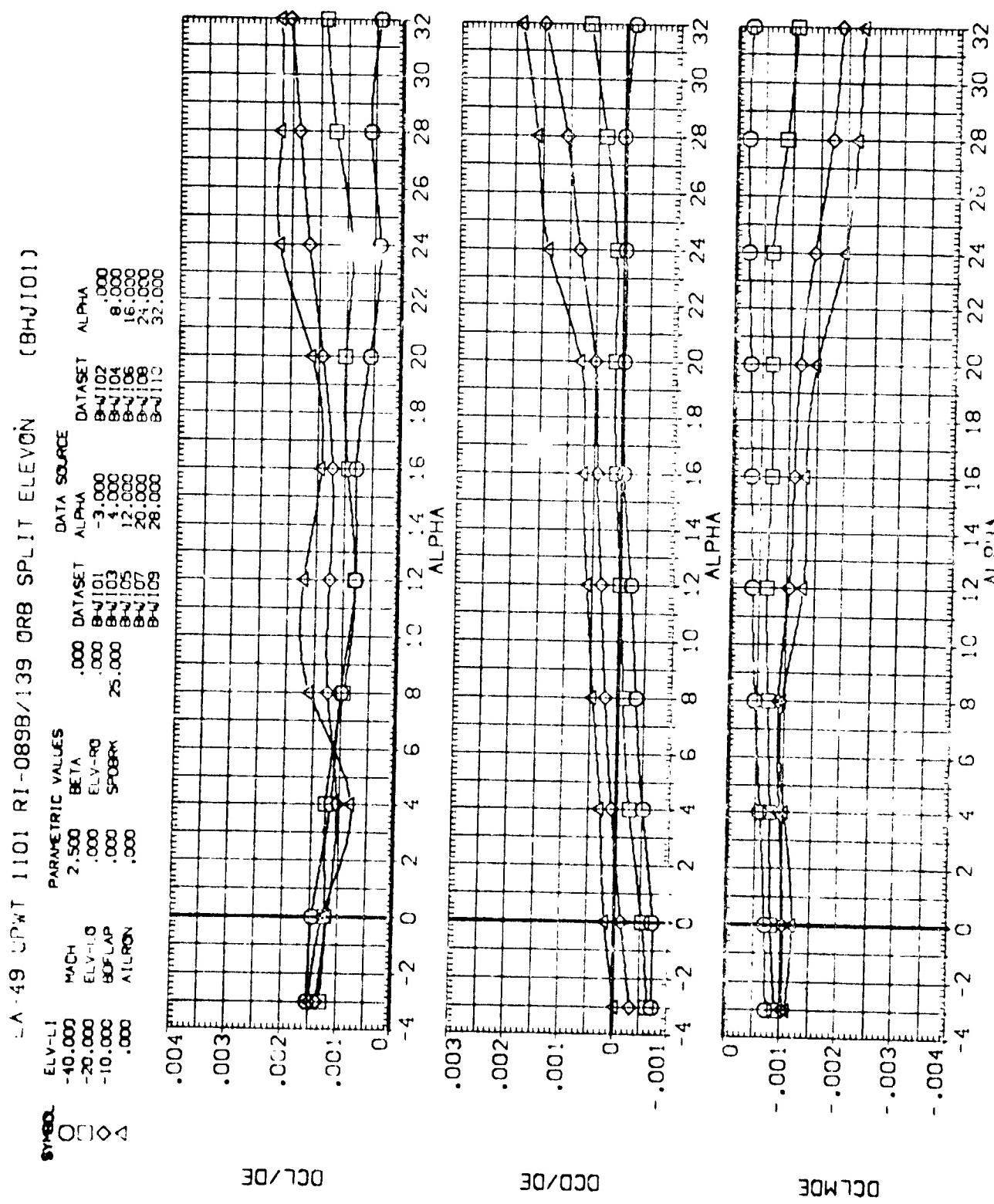


FIGURE 8. INBOARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (BHJ101)

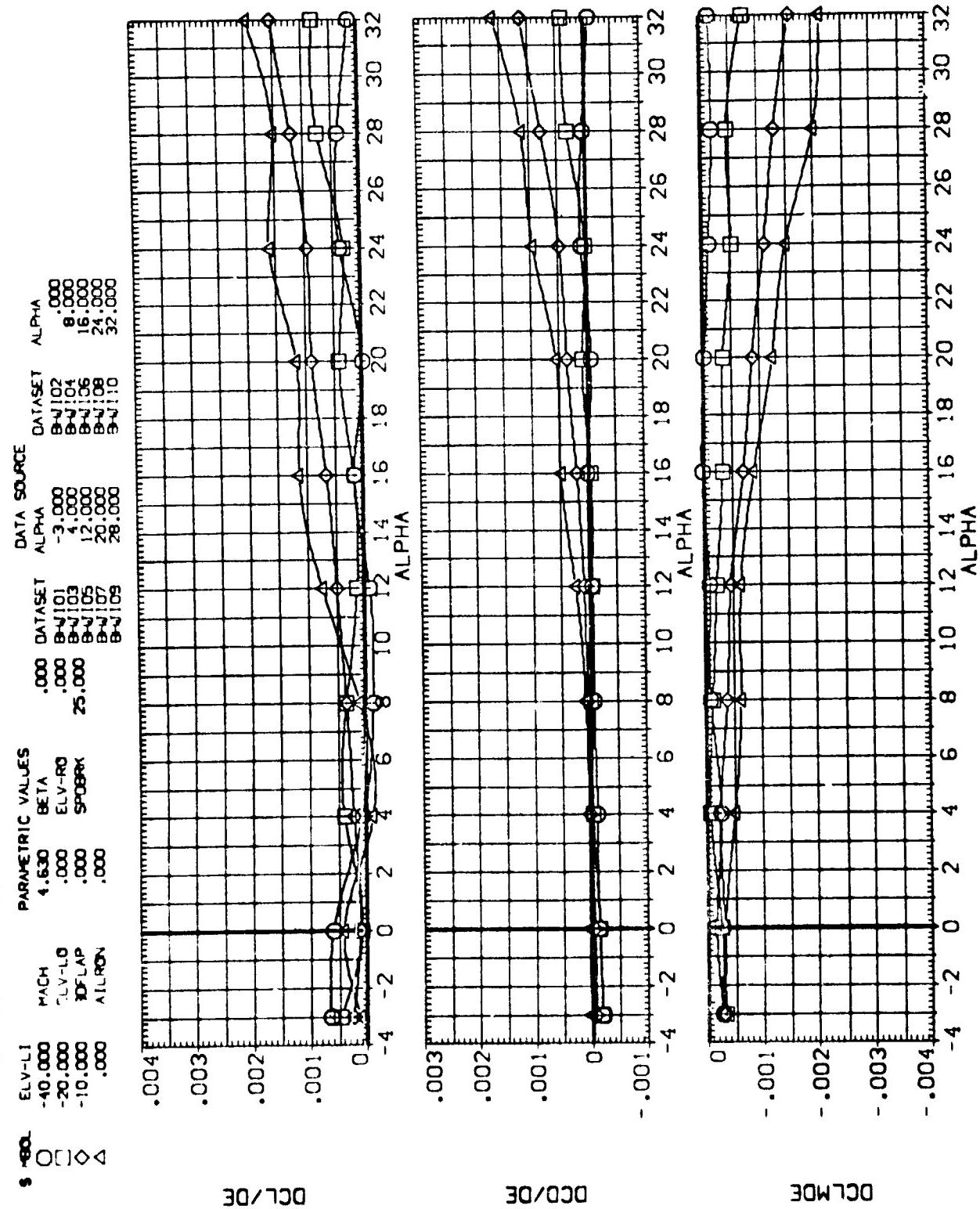


FIGURE 8. INBOARD ELEVON PITCH CONTROL EFFECTIVENESS

PAGE 26

LA-49 UP, r 1101 RI-089B/139 GRS SPLIT E-EVN  
 (RHJ001)

	ALPHA	MACH	2.500	BETA	.000	DATASET	ELV-L0	DATA SOURCE	ELV-L0
SYMBOL	-4.172	MACH	.000	ELV-R1	.000	RJ-001	0.000	RJ-008	-10.000
O	-0.012	ELV-L1	.000	SP00X	.000	RJ-009	-20.000	RJ-010	-40.000
+	4.020	BDFLAP	.000						
*	8.106	AT-RON	.000						
V	12.312								

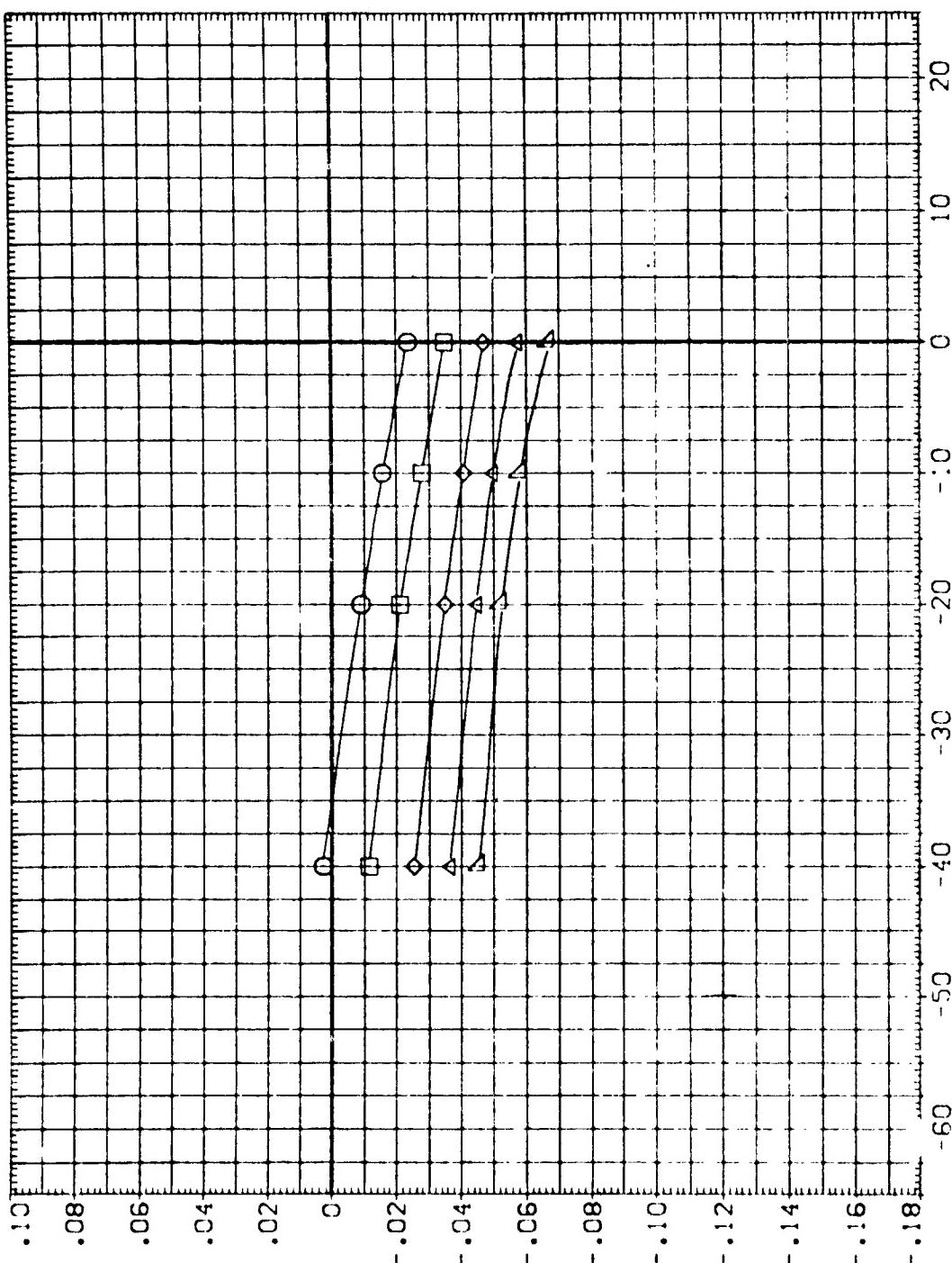


FIGURE 9. PITCHING MOMENT COEFFICIENT EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)  
 PARAMETRIC VALUES  
 ALPHA 16.292 MACH 2.500 BETA .000 DATASET RI-001 ELV-L0 DATA SOURCE RI-008  
 20.438 E-V-L1 .000 ELV-RI .000 DATASET RI-009 RI-010 ELV-L0 DATA SOURCE RI-010  
 24.504 BDF LAP .000 SPD8K 25.000 DATASET RI-009 -20.000 RI-010 ELV-L0 DATA SOURCE RI-010  
 28.669 AIL-RDN .000  
 32.717

SYMBOLS

- 
- 
- ◊
- △
- ▽

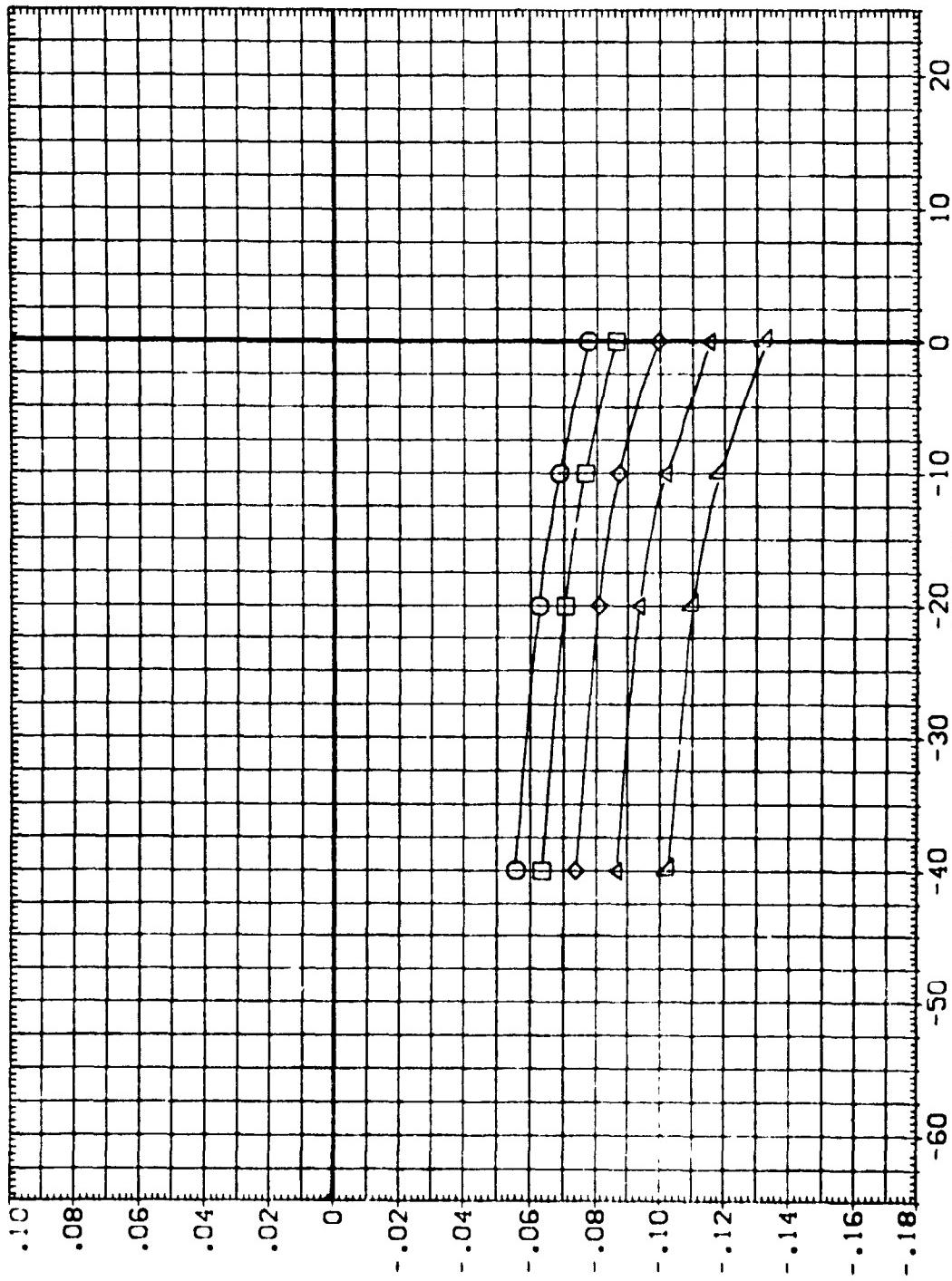


FIGURE 9. OUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 L-1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)

	PARAMETRIC VALUES						
ALPHA	MACH	4.600	BETA	.000	DATA SET	ELV-L0	DATA SOURCE
-3.58	E_V-L1	.000	ELV-R1	.000	RHJ001	RHJ008	ELV-L0
-1.553	BOFLAP	.000	SPDBRK	25.000	RHJ009	RHJ010	RHJ010
.433	AILRON	.000					
2.462							
4.466							

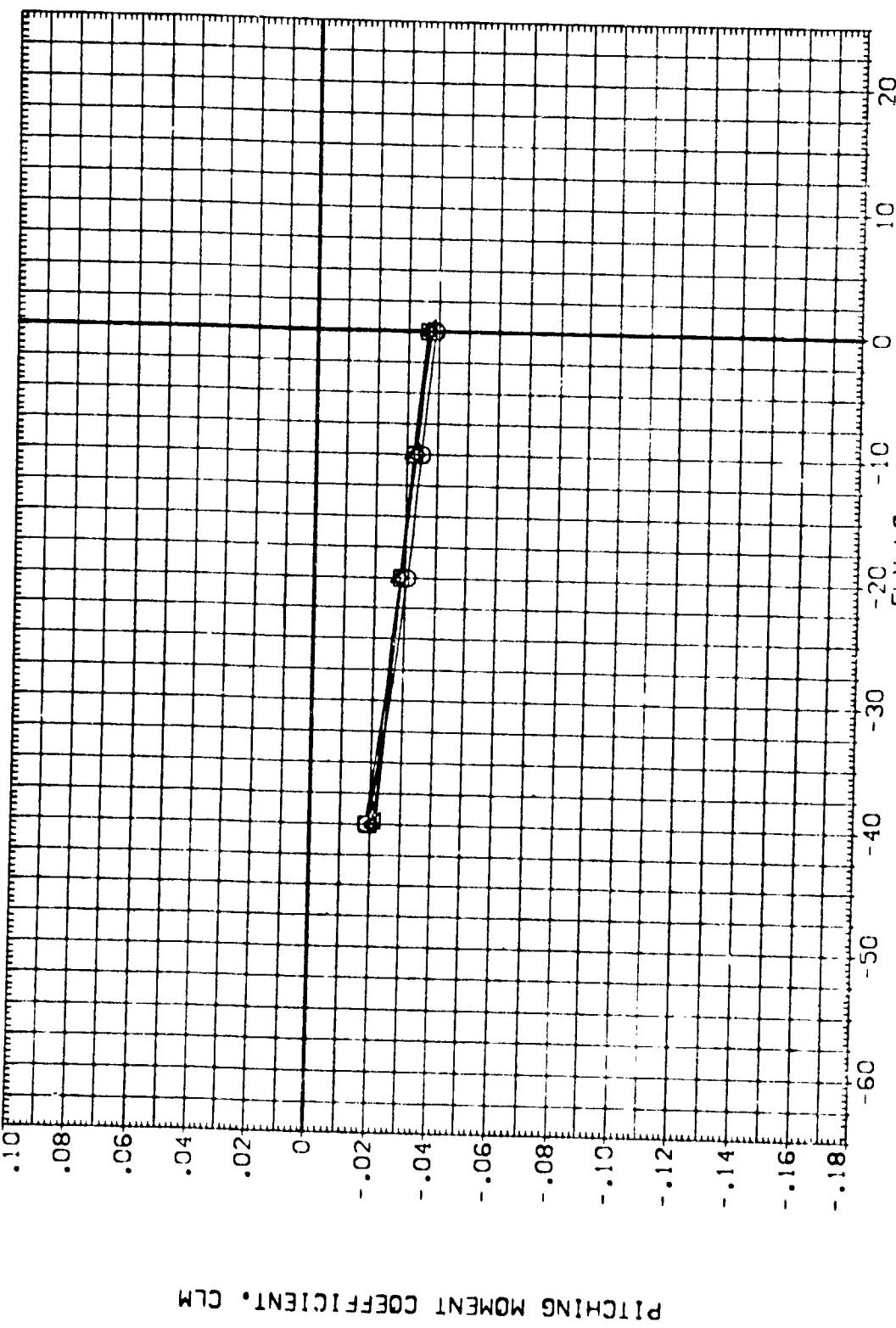


FIGURE 9. OUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)

PARAMETRIC VALUES	DATA SOURCE
ALPHA .9.540	MACH .500
ELV-LI 12.575	BETA .000
BOFLAP 16.602	ELV-RI .000
AIRRON 20.646	SPBPK 25.000
24.715	RHJ001 RHJ003
	RHJ009 RHJ010

SYMBOLS

- O MACH
- ELV-LI
- △ BOFLAP
- ▽ AIRRON

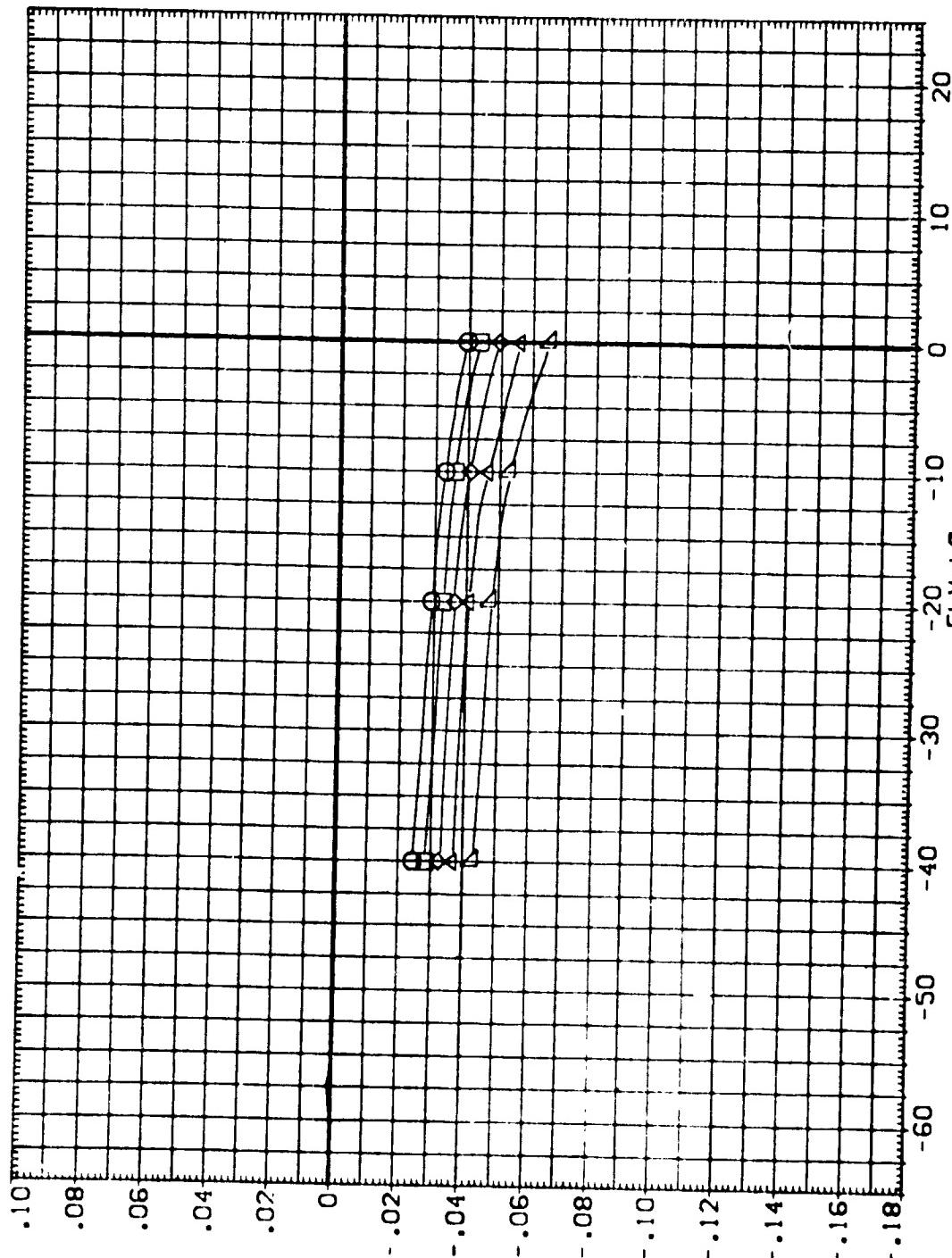


FIGURE 9. OUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 RI-089B/139 ORB SPLIT ELEVON (RHJ001)

	PARAMETRIC VALUES			DATA SOURCE	ELV-L0	ELV-R0	DATA SET	ELV-L0	ELV-R0
ALPHA	4.500	BETA	.000	RJ4001	.000	RJ4008	RJ4008	-10.000	-40.000
MACH	.000	ELV-L1	.000	RJ4001	.000	RJ4008	RJ4008	-20.000	-40.000
ELV-L1	.000	SP09X	25.000	RJ4009	.000	RJ4010	RJ4010	-	-
BOFLAP	.000								
AIRRON	.000								

SYMBOLS

- O
- △
- ▽

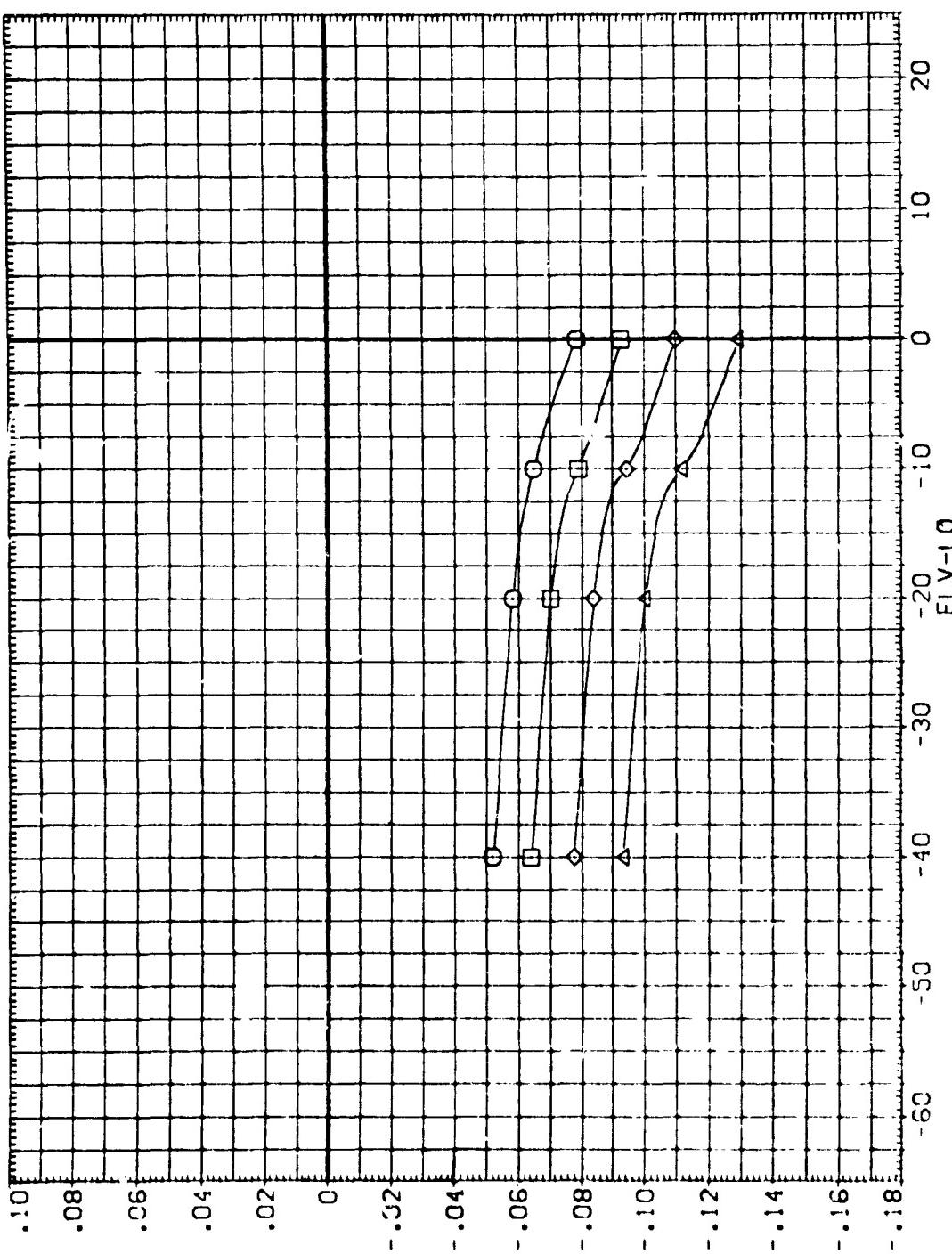


FIGURE 9. FORWARD ELEVON PITCH CONTROL EFFECTIVENESS

LA-49 UPWT 1101 R!-089B/139 ORB SPLIT ELEVON (BHJ001)

	PARAMETRIC VALUES						
	MACH	BETA	.000	DATA SET	ALPHA	DATA SOURCE	ALPHA
ELV-L6	-40.000	2.500	ELV-RI	B-V001	-3.000	B-V002	.000
ELV-L1	-20.000	.000	SPOKEM	B-V003	4.000	B-V004	8.000
BOFLAP	-10.000	.300		B-V005	12.000	B-V006	16.000
AILRON	.000	.000		B-V007	20.000	B-V008	24.000
				B-V009	28.000	B-V010	32.000

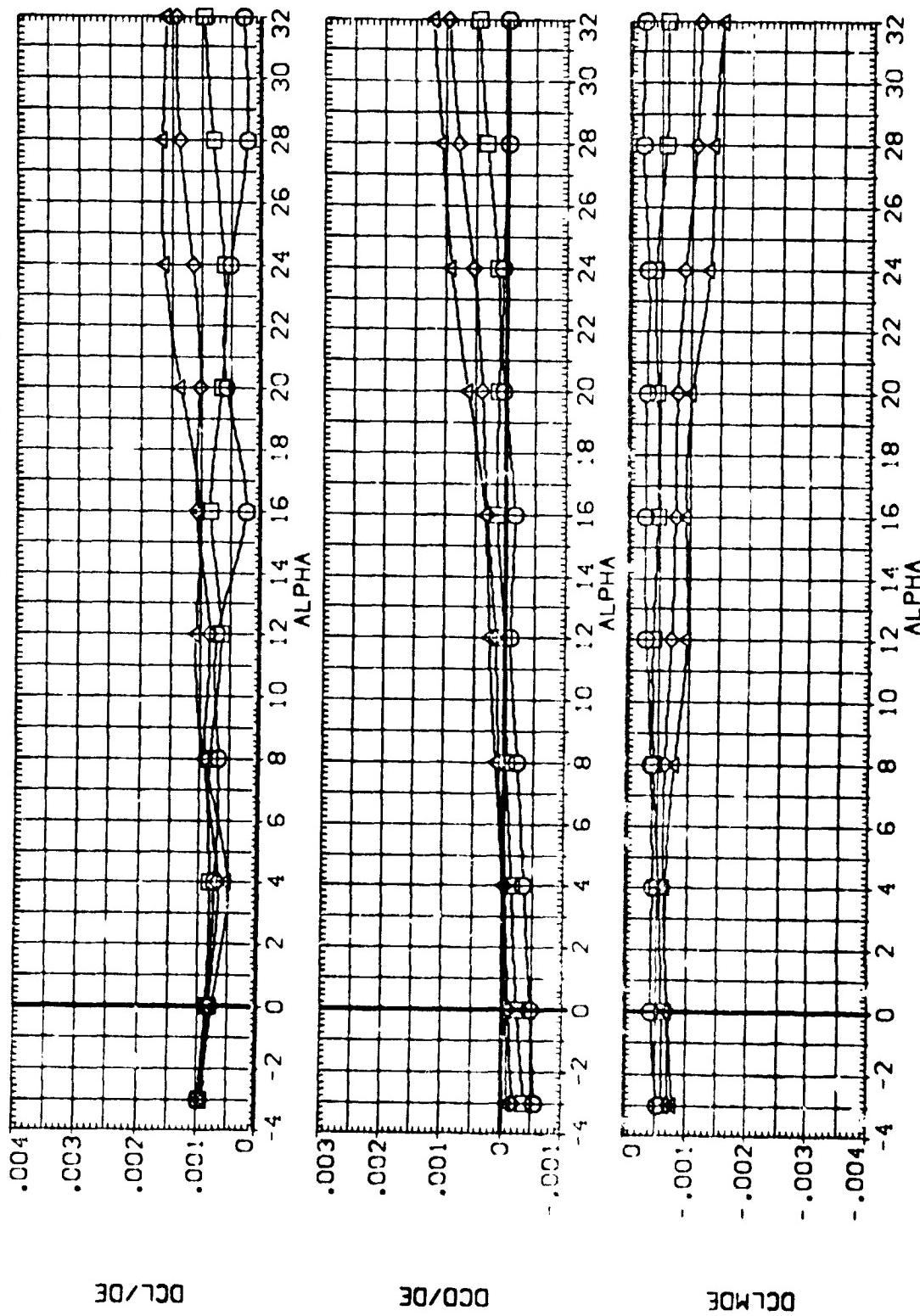


FIGURE 9. OUTBOARD ELEVON PITCH CONTROL EFFECTIVENESS

A-49 U/PWT 1101 P1-0898/139 ORB SPLIT ELEVON (BHJ001)

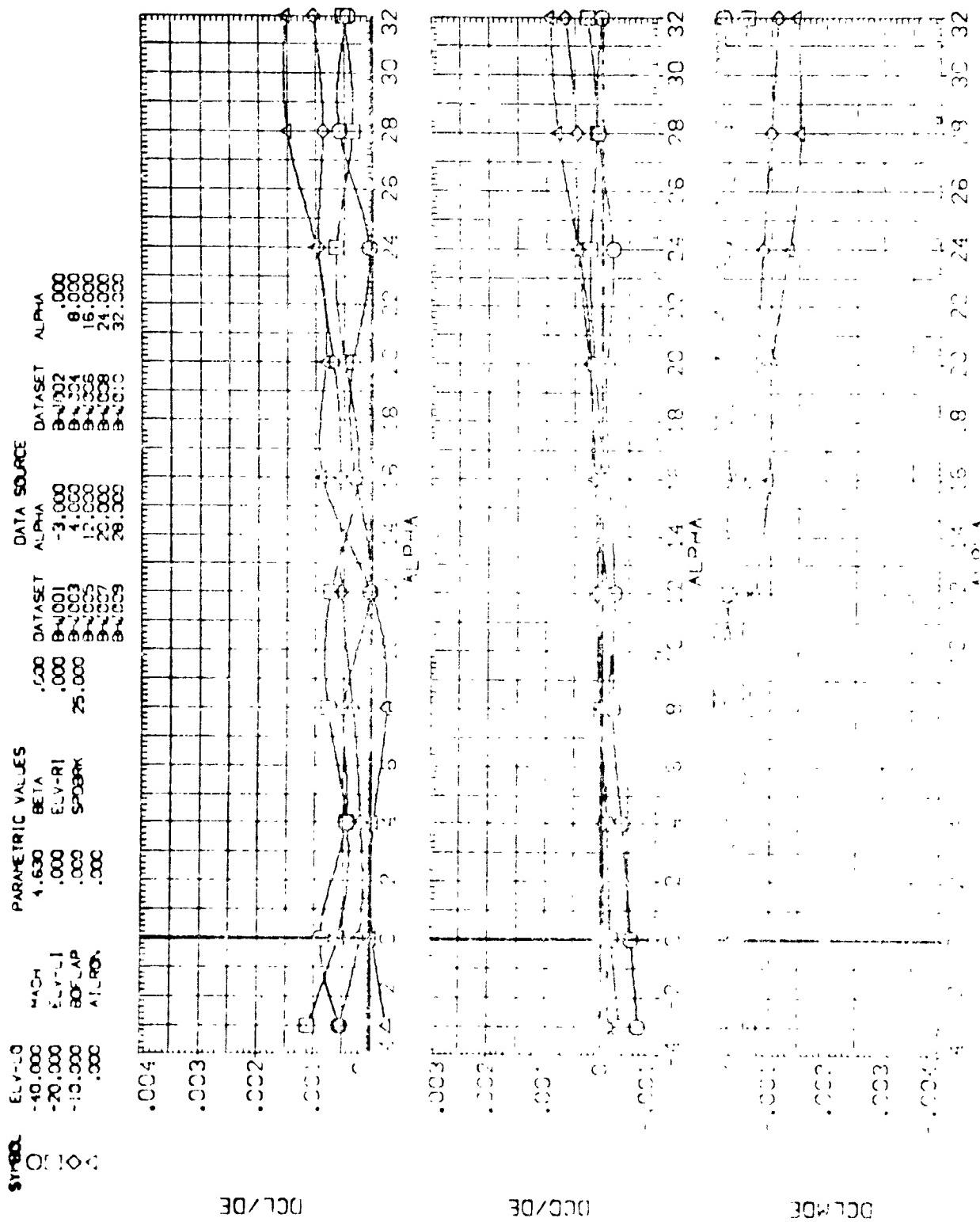
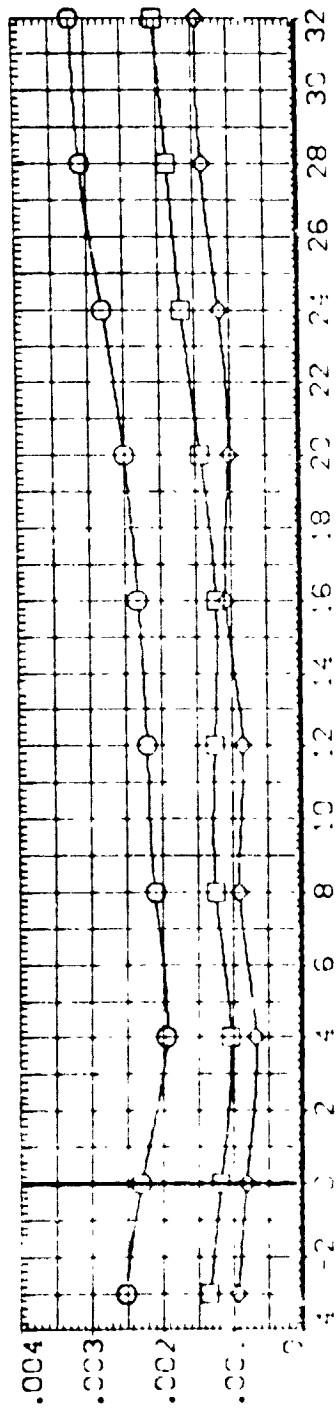


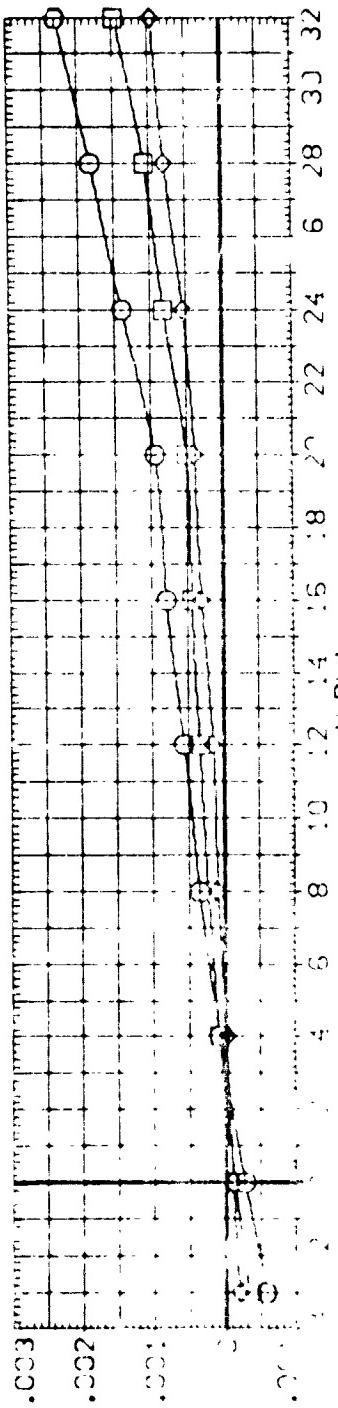
FIGURE 35. TRIM CONDITIONS FOR DCL/DE, DCC/DE, AND DCL/MOD MODES

PAGE 35

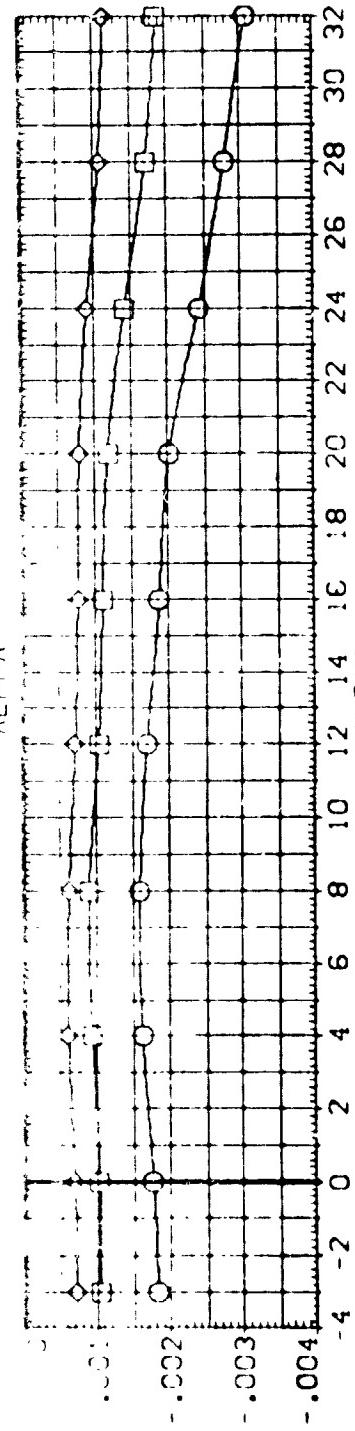
DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 (C)005) C -19 SPV 101 R1-0898; 39 088 SP-L1 ELEVON  
 (C)002) S -19 SPV 101 R1-0898; 39 088 SP-L1 ELEVON  
 (C)003) O -19 SPV 101 R1-0898; 39 088 SP-L1 ELEVON



001/00



002/00



003/00

FIGURE 10. COMPARISON OF FULL SPAN, INBOARD AND OUTBOARD PITCH CONTROL ( $\alpha_E = -10^\circ$ )  
 $(\alpha_{MACH} = 2.50)$



DATA SET	STRUCTURE	DESCRIPTION	ELV-L0	ELV-R1	ELV-R0
ICN 005	DA	LA-49 SPOT 1101 R-0888/39 098 S2.11 ELEV06	-10.000	-10.000	-10.000
ICN 006	DA	LA-49 SPOT 1101 R-0888/39 098 S2.11 ELEV06	-10.000	-10.000	-10.000
ICN 007	DA	LA-49 SPOT 1101 R-0888/39 098 S2.11 ELEV06	-10.000	-10.000	-10.000
ICN 008	DA	LA-49 SPOT 1101 R-0888/39 098 S2.11 ELEV06	-10.000	-10.000	-10.000

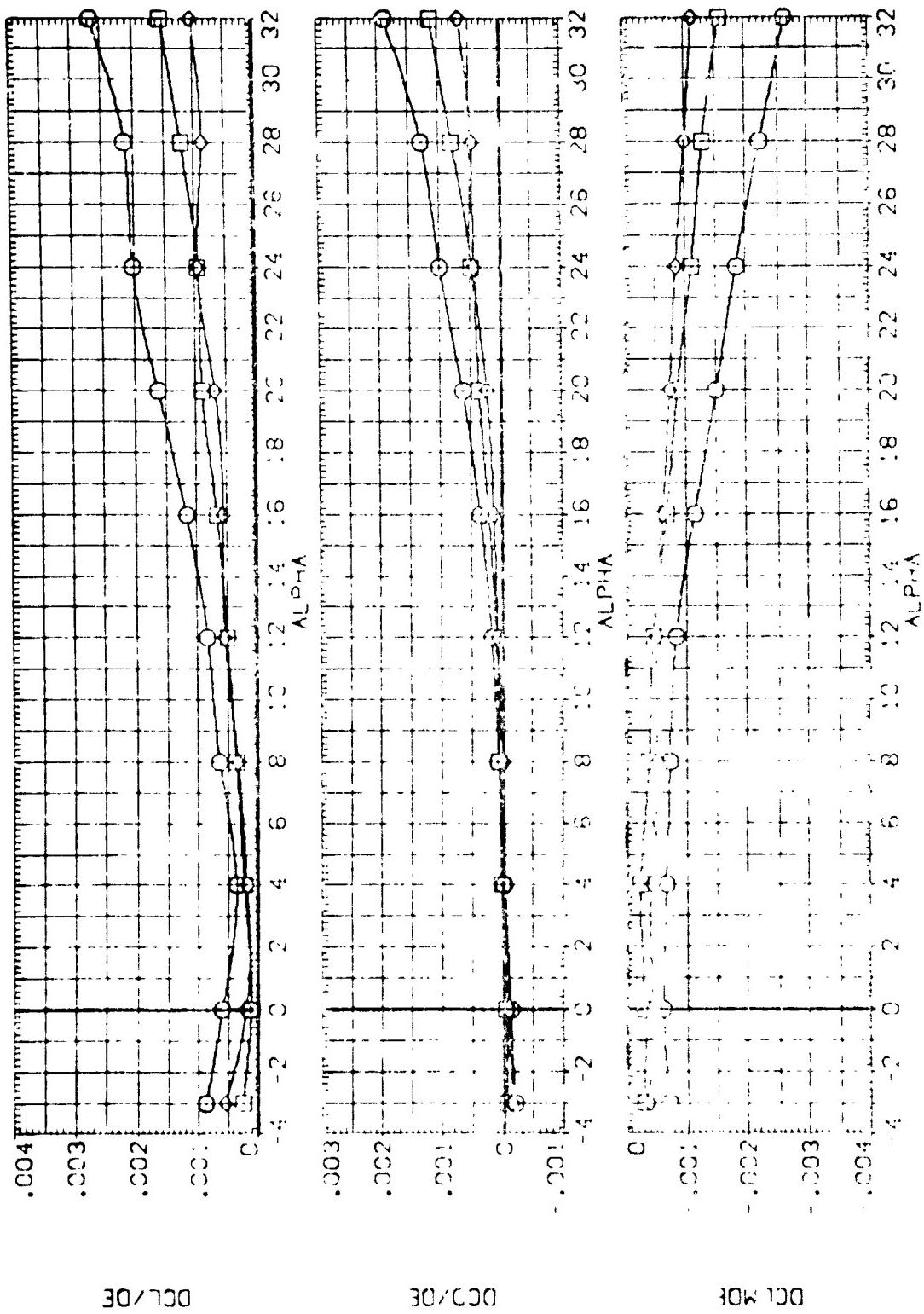


FIGURE 10. COMPARISON OF FLU. SWAN, INCARC AND GUTBOARD PITCH CON RATE (DE = -10)   
 DCL/DE = 4.00

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 [DN006] □ LA-19 SPVT RI-0688/139 068 SP/11 ELEVON  
 [DN006] □ LA-19 SPVT RI-0688/139 068 SP/11 ELEVON  
 [DN006] □ LA-19 SPVT RI-0688/139 068 SP/11 ELEVON

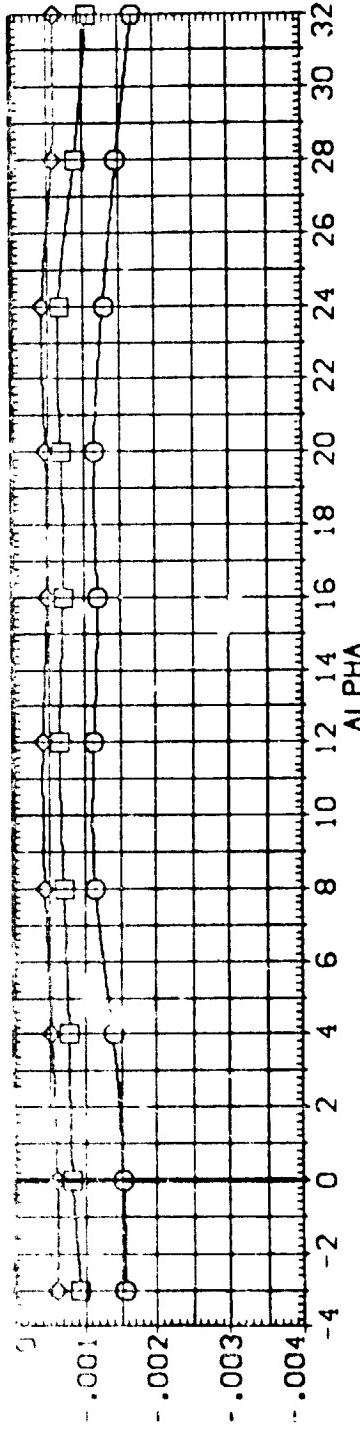
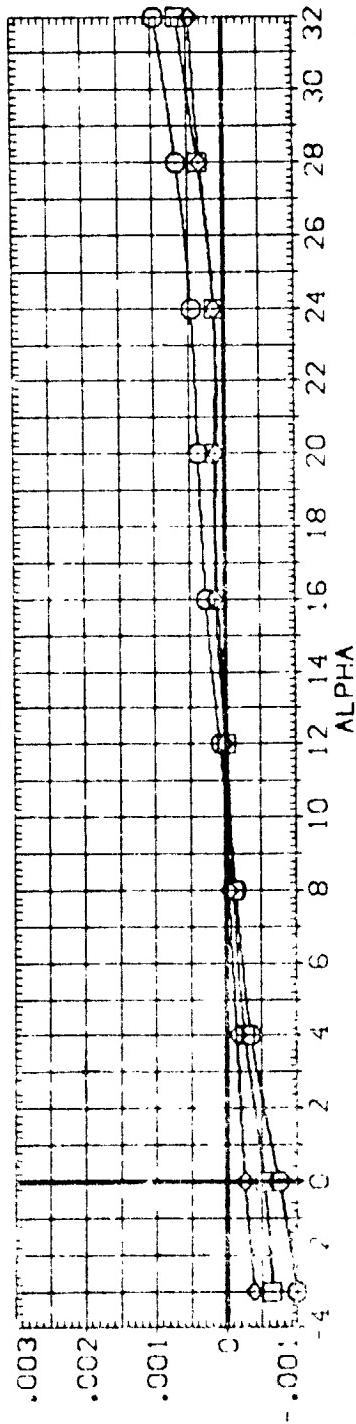
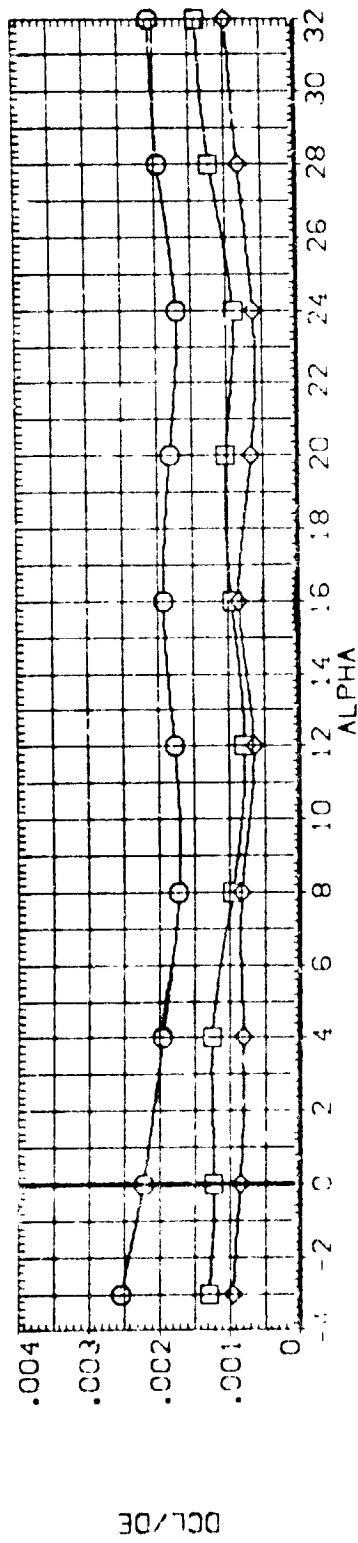


FIGURE 11. COMPARISON OF FULL SPAN, INBOARD AND OUTBOARD PITCH CONTROL (DE=-20)  
 AIRMACH = 2.50

PAGE 36

REPRODUCED  
ORIGINALLY

100%

DATA SET SYMBOL	CONFIGURATION	DESCRIPTION	ELV-L0	ELV-L1	ELV-RI	ELV-R0
(C4006)	LA-49 UNT	101 RI-389B/139	.008 SPLIT ELEVON	-20,000	-20,000	-20,000
(C4003)	LA-49 UNT	101 RI-089A/139	.008 SPLIT ELEVON	-20,000	-20,000	-20,000
(C4009)	LA-49 UNT	101 RI-089A/139	.008 SPLIT ELEVON	-20,000	-20,000	-20,000

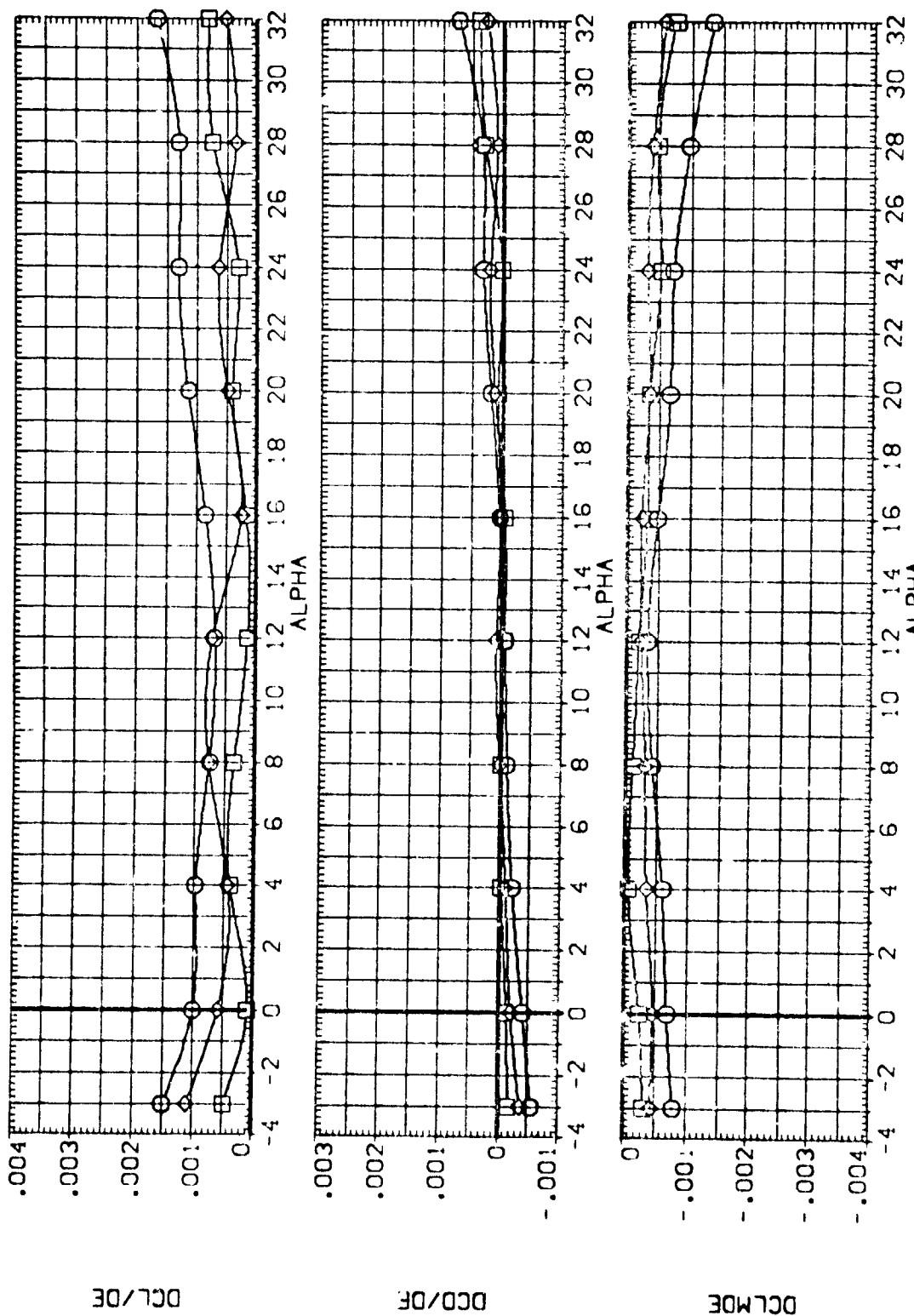


FIGURE 11. COMPARISON OF FULL SPAN, INBOARD AND OUTBOARD PITCH CONTROL (DE=-20)  
 $(3)_{MACH} = 4.63$

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 [C] 0071 LA-19 SPOT 1101 RT-0898/139 DCL/DE ELEVON  
 [C] 0081 LA-19 SPOT 1101 R-0898/139 DCL/DE ELEVON  
 [C] 0091 LA-19 SPOT 1101 R-0898/139 DCL/DE ELEVON  
 [C] 0101 LA-19 SPOT 1101 R-0898/139 DCL/DE ELEVON

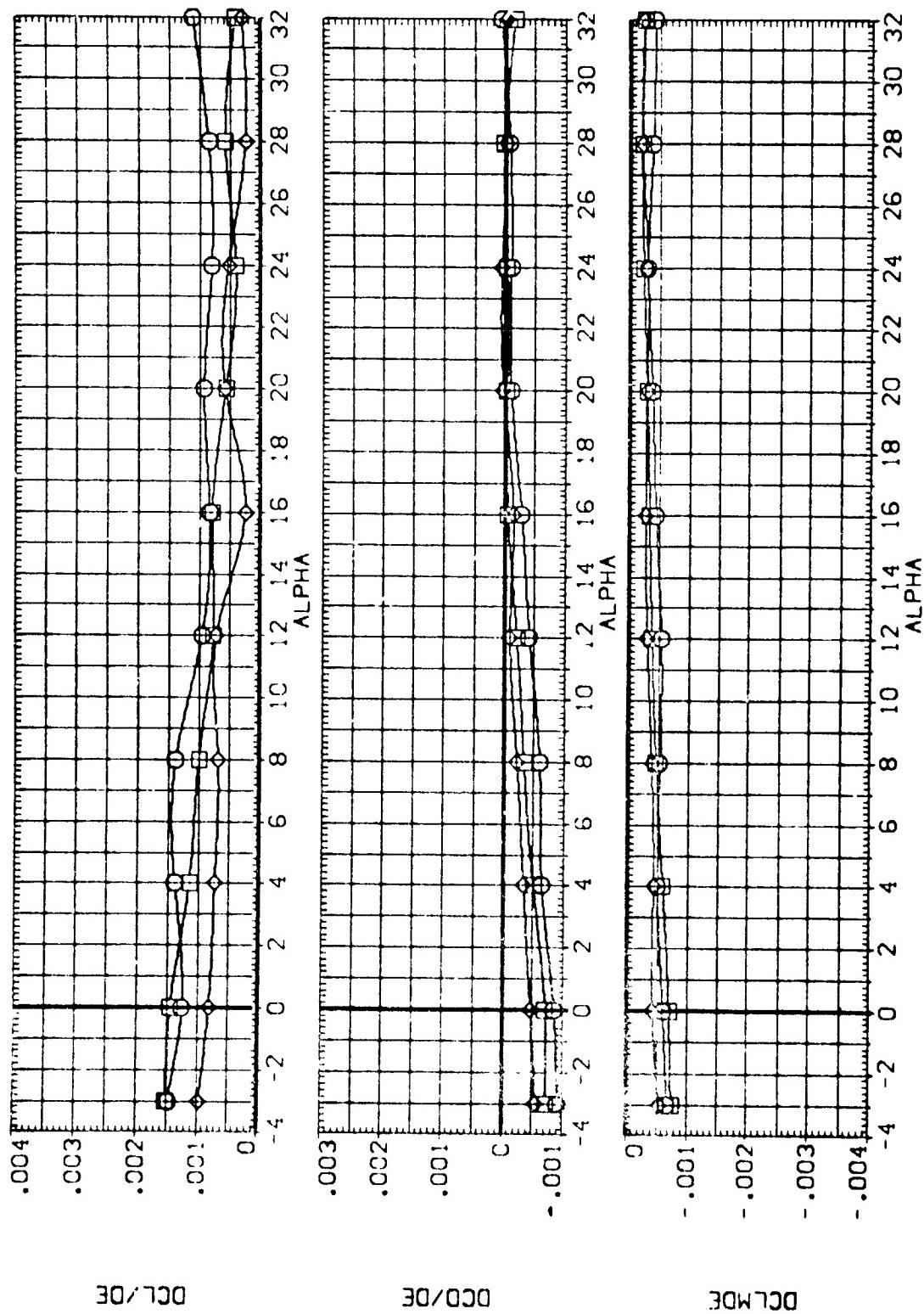


FIGURE 12. COMPARISON OF FULL SPAN, INBOARD AND OUTBOARD PITCH CONTROL (DE = -40)  
 $(\lambda)_MACH = 2.50$

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 {CN-000} LA-19 UVT 1101 RI-0898/139 DCL/DE ELEVON -40.000 -40.000 -40.000  
 {CN-004} LA-19 UVT 1101 RI-0898/139 DCL/DE ELEVON -40.000 -40.000 -40.000  
 {CN-005} LA-19 UVT 1101 RI-0898/139 DCL/DE ELEVON -40.000 .000 .000

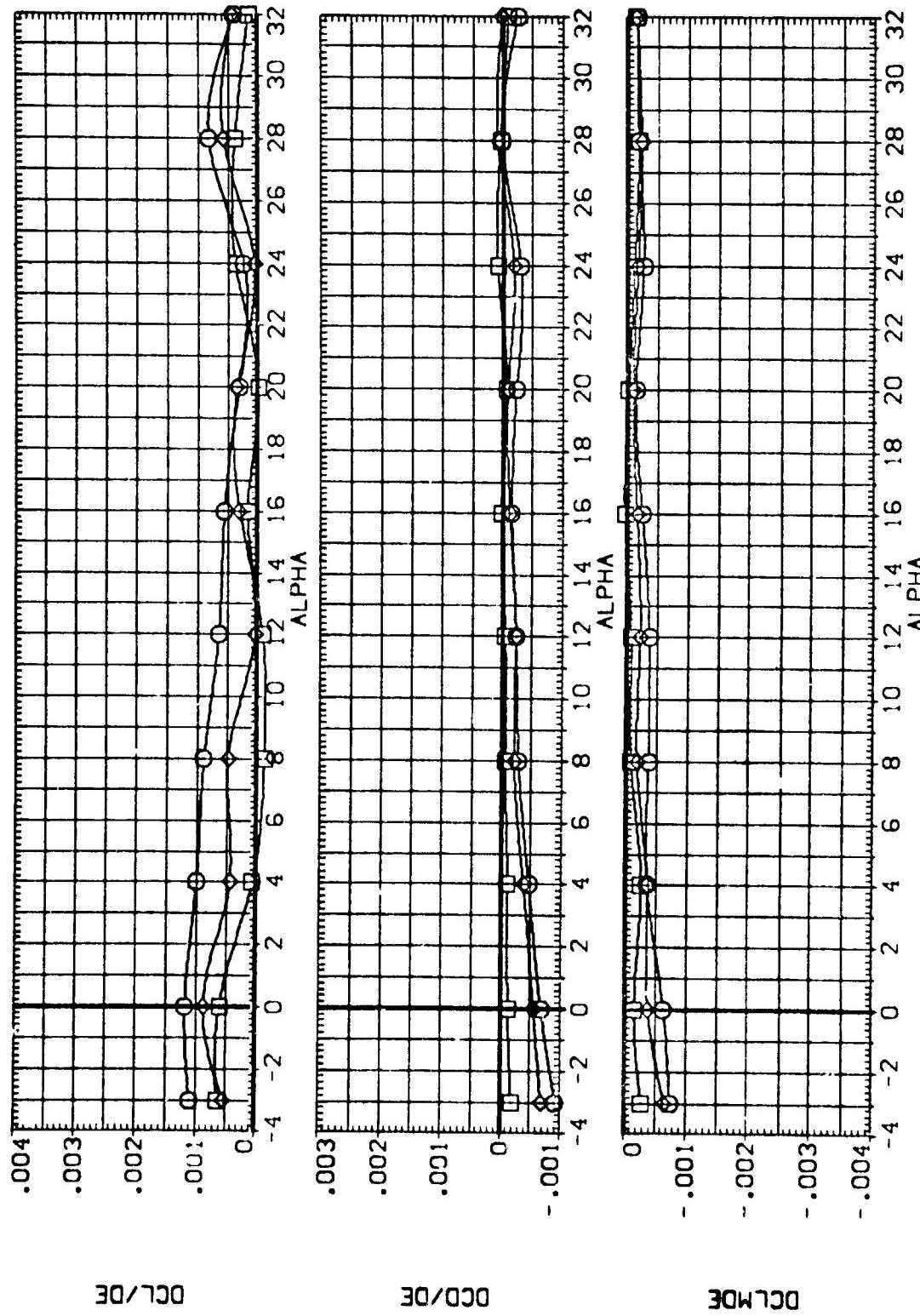


FIGURE 12. COMPARISON OF FULL SPAN. INBOARD AND OUTBOARD PITCH CONTROL (CCE=-40)  
 $(B)_\infty$  MACH = 4.63  
 PAGE 39

DATA SET SW#0016  
 CONFIGURATION DESCRIPTION: RI-0893/139 ORB SP-LIT ELEVON  
 DATA SET SW#0017  
 CONFIGURATION DESCRIPTION: RI-0893/139 ORB SP-LIT ELEVON

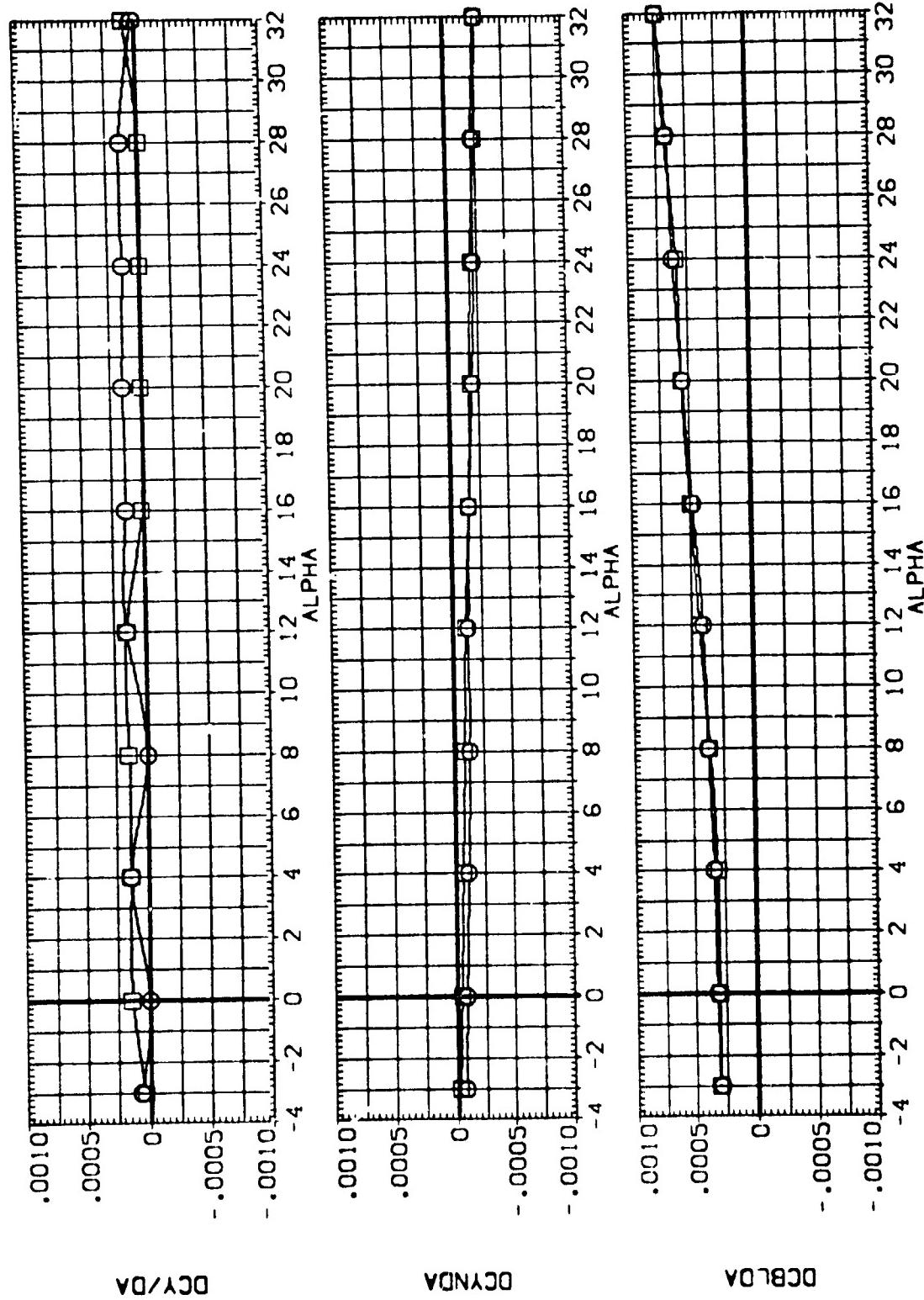


FIGURE 13. OUTBOARD AIERON EFFECTIVENESS WITH INBOARD ELEVONS DEFLECTED  
 $(\text{MACH} = 2.50)$

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 [3-016] Q LA-19 SPN 1101 RI-0898/139 GRS SPLIT ELEVON  
 [3-017] L LA-19 SPN 1101 RI-0898/139 GRS SPLIT ELEVON

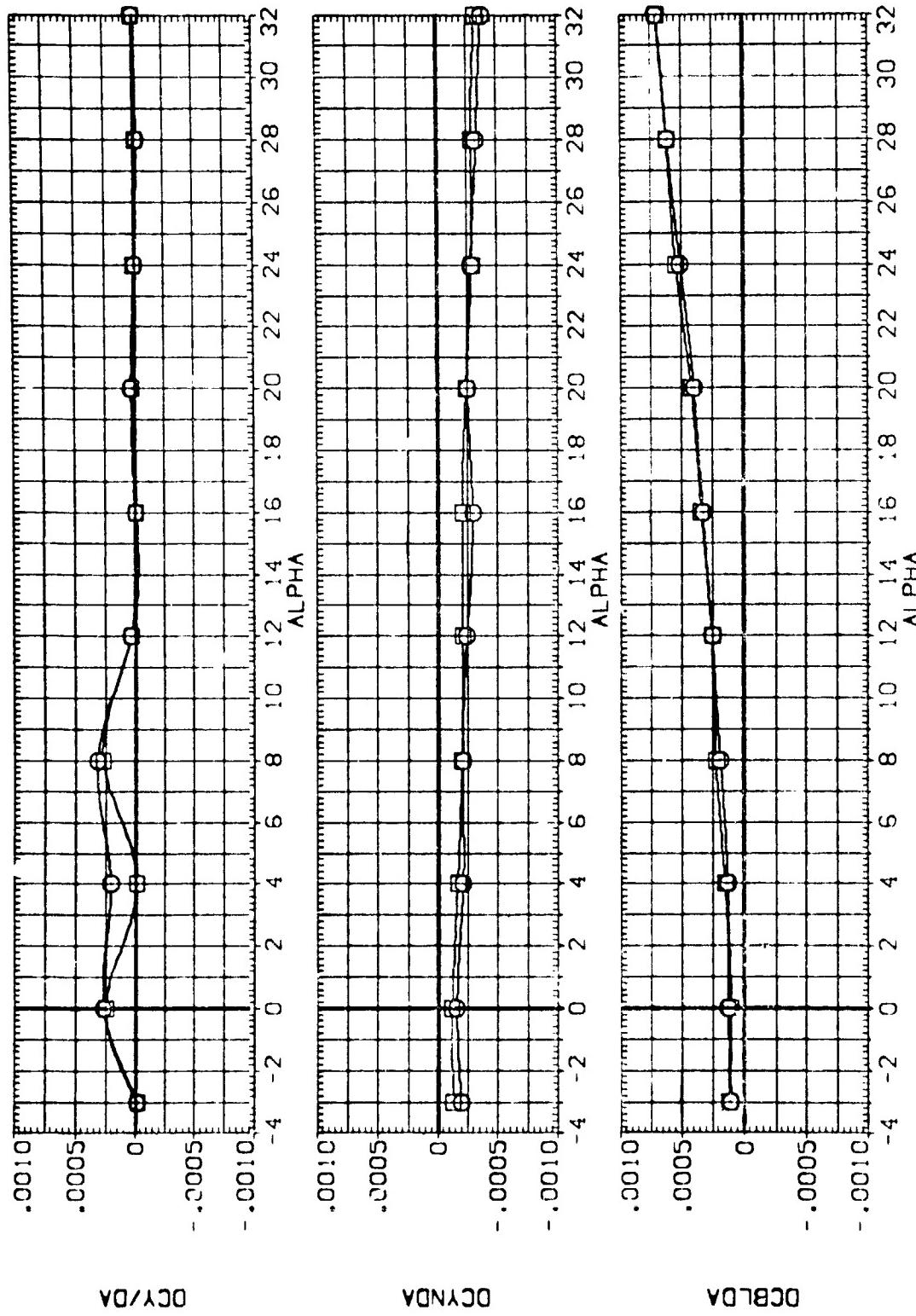


FIGURE 13. OUTBOARD AILERON EFFECTIVENESS WITH INBOARD ELEVONS DEFLECTED  
 $(\beta)_{ACM} = 4.63$

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 {A}011 LA-49 LSP1 101 RI-0898/138 DBB SPLIT ELEVON  
 {B}013 LA-49 LSP1 101 RI-0898/138 DBB SPLIT ELEVON

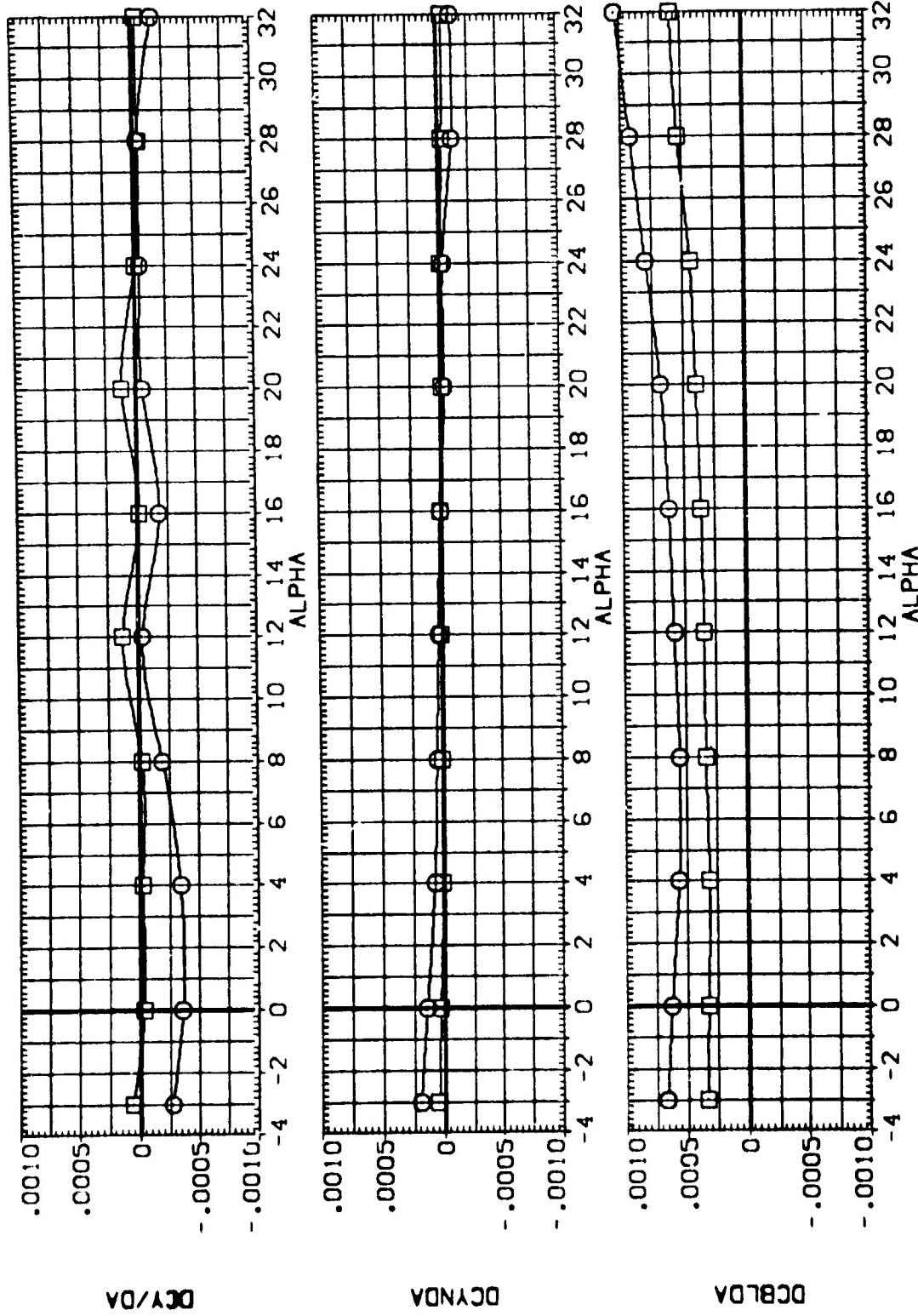
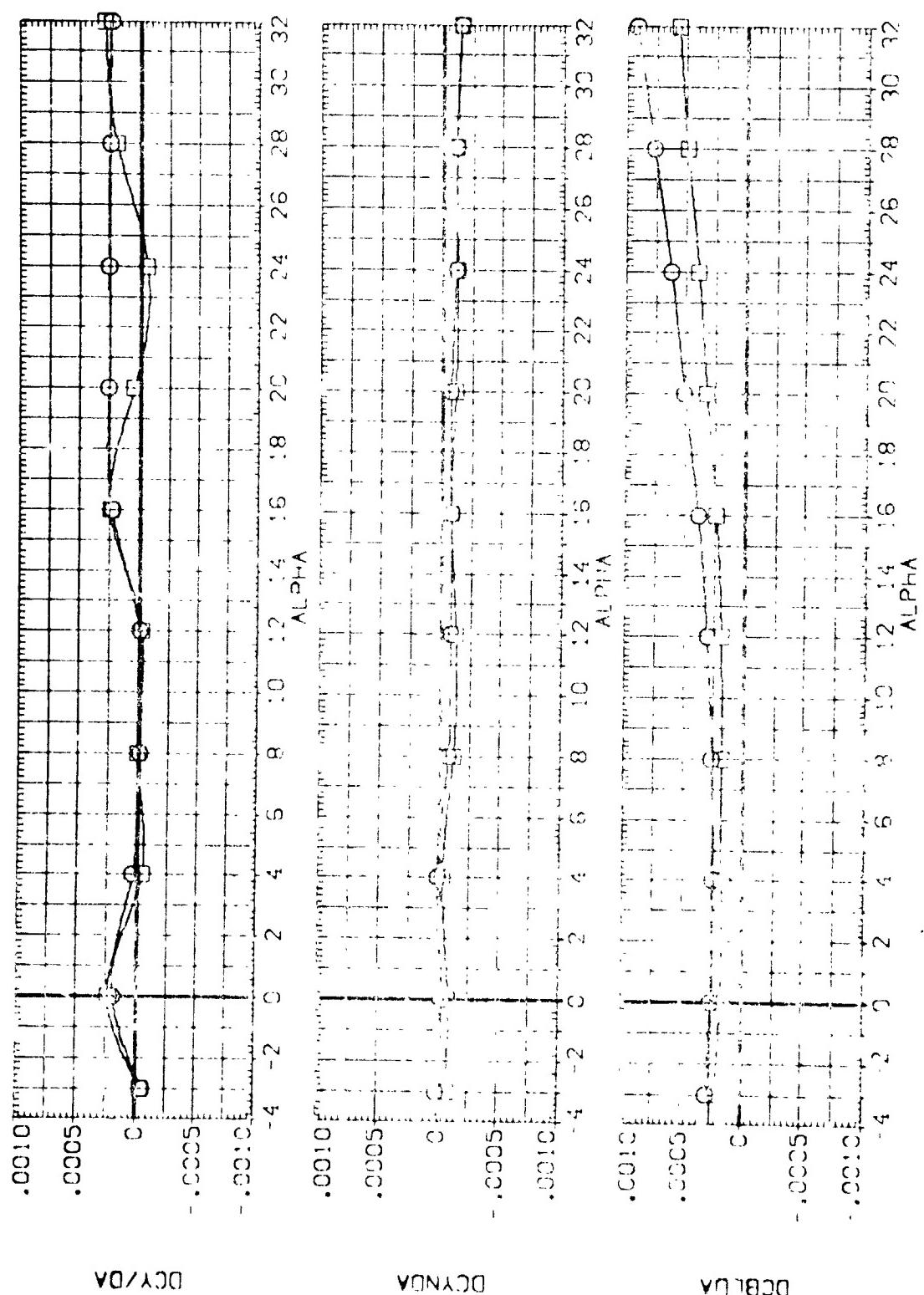


FIGURE 14. COMPARISON OF FULL SPAN AND OUTBOARD ELEVON DEFLECT. FOR ROLL (DE=-10)  
 $(\Delta MACH = 7.50)$



DATA SET SYMBOL	CONFIGURATION	DESCRIPTION
{A4011}	C	LA 15 5/1 10/1 RI 3832/139 086
{A4013}	C	LA 43 5/1 10/1 RI 3832/139 086

ELV-L0	ELV-L1	ELV-R1	ELV-R0
100.000	100.000	-20.000	-20.000
100.000	100.000	-10.000	-20.000
100.000	100.000	-10.000	-20.000



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PAGE 43

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ELV-L	ELV-U	ELV-R
(B-4012)	C	-1.13	2.41	1.13
(B-4015)	C	-1.19	2.41	1.19
(B-4016)	C	-1.19	2.41	1.19
	ELVON	-38.33	38.33	38.33
	ELVON	-38.88	38.88	38.88
	ELVON	-41.00	39.00	39.00

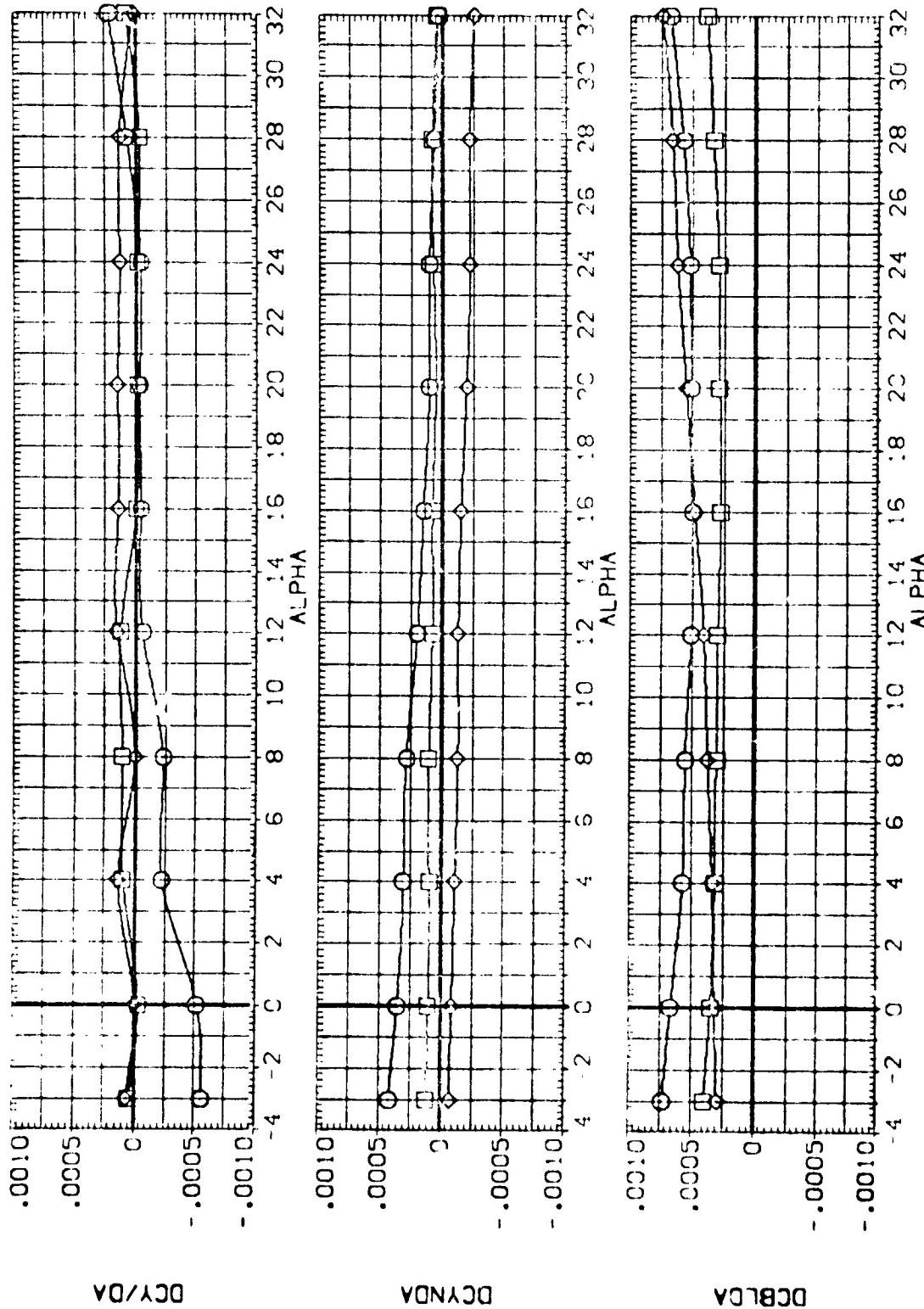


FIGURE 15. COMPARISON OF FULL SPAN AND CUTBOARD ELEVON DEFLECT. FOR ROLL (DE=-20)  
 $(A)_MACH = 2.50$

DATA SET SPAN: CONFIGURATION DESCRIPTION: 1101 R1-0888/138 088 STAT IT ELEVON  
 1101 R1-0888/139 088 STAT IT ELEVON  
 1101 R1-0888/139 088 STAT IT ELEVON  
 1101 R1-0888/139 088 STAT IT ELEVON

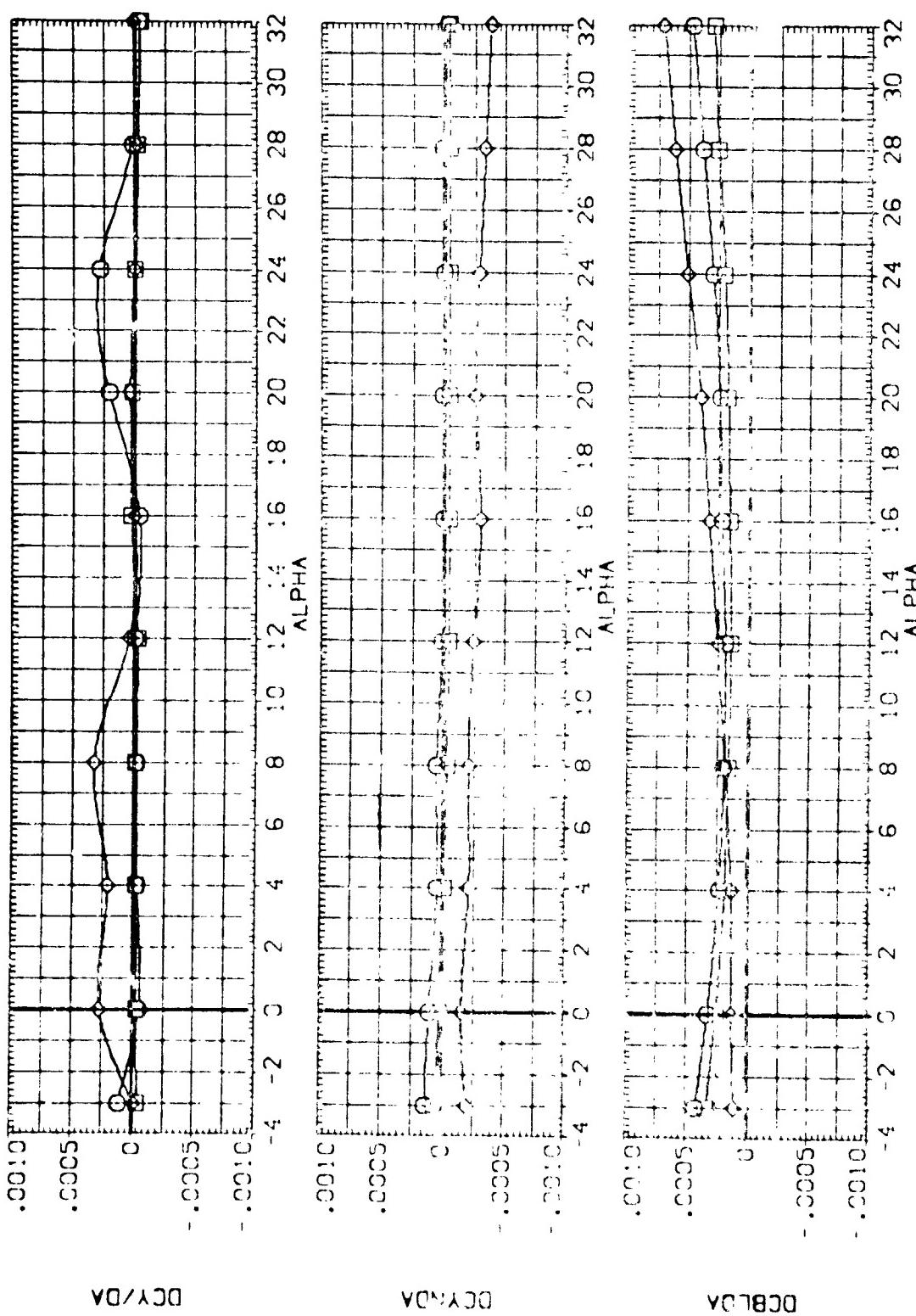


FIGURE 15. COMPARISON OF FULL SPAN AND OUTBOARD ELEVON EFFECT. FOR ROLL (DE=20)  
 (3) w/c = 4.63

PAGE 45

DATA SET SYMBOL CONFIGURATION DESCRIPTION  
 [LA-19 U] LA-19 U 1101 RI-0898/139 088 SP/LT ELEVON  
 [LA-19 U] LA-19 U 1101 RI-0898/139 088 SP/LT ELEVON  
 [LA-19 U] LA-19 U 1101 RI-0898/139 088 SP/LT ELEVON

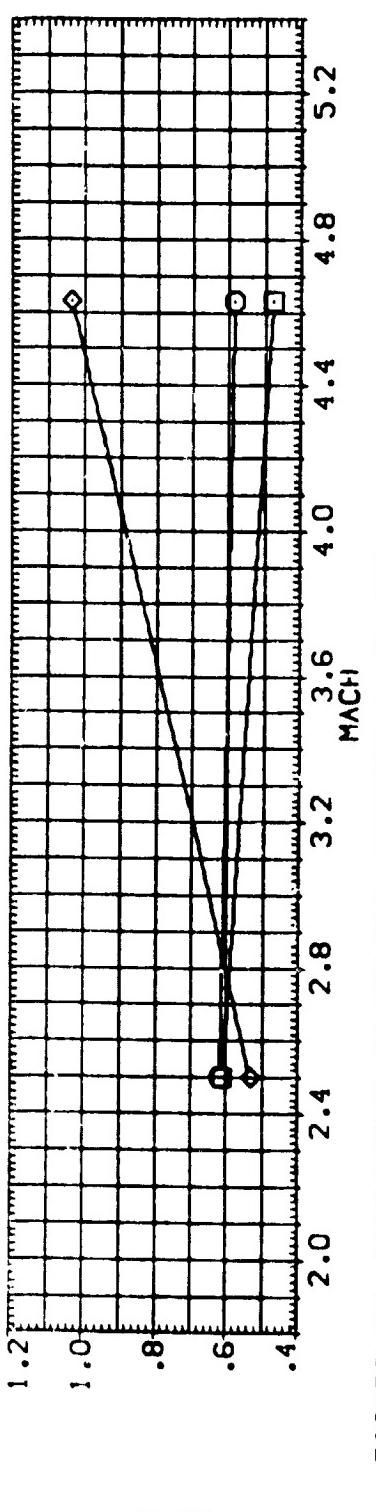
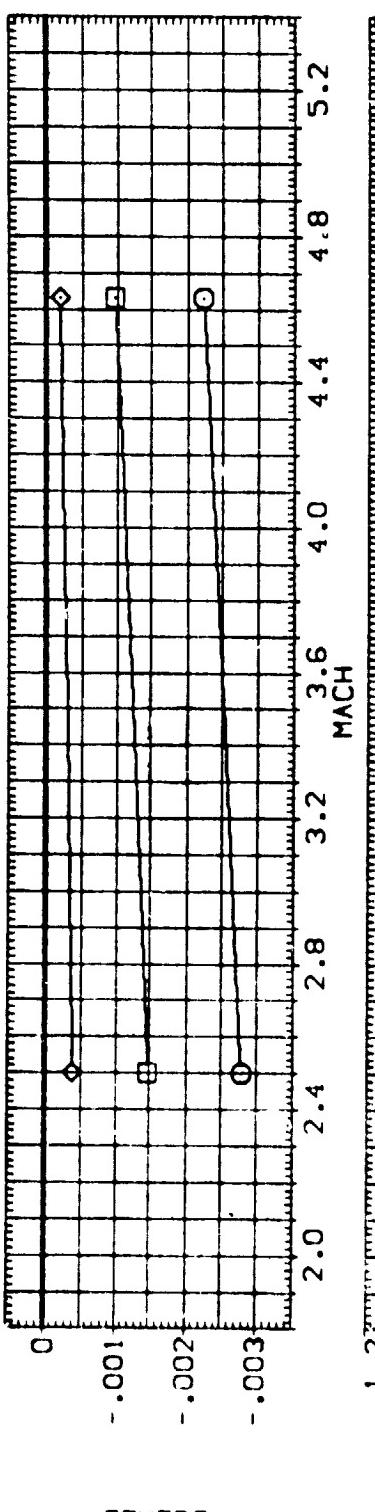
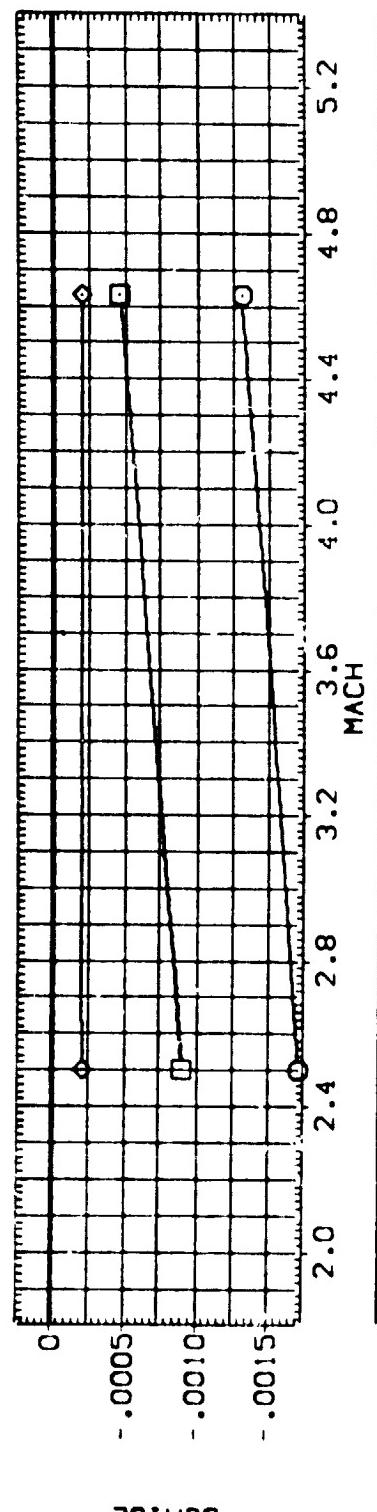
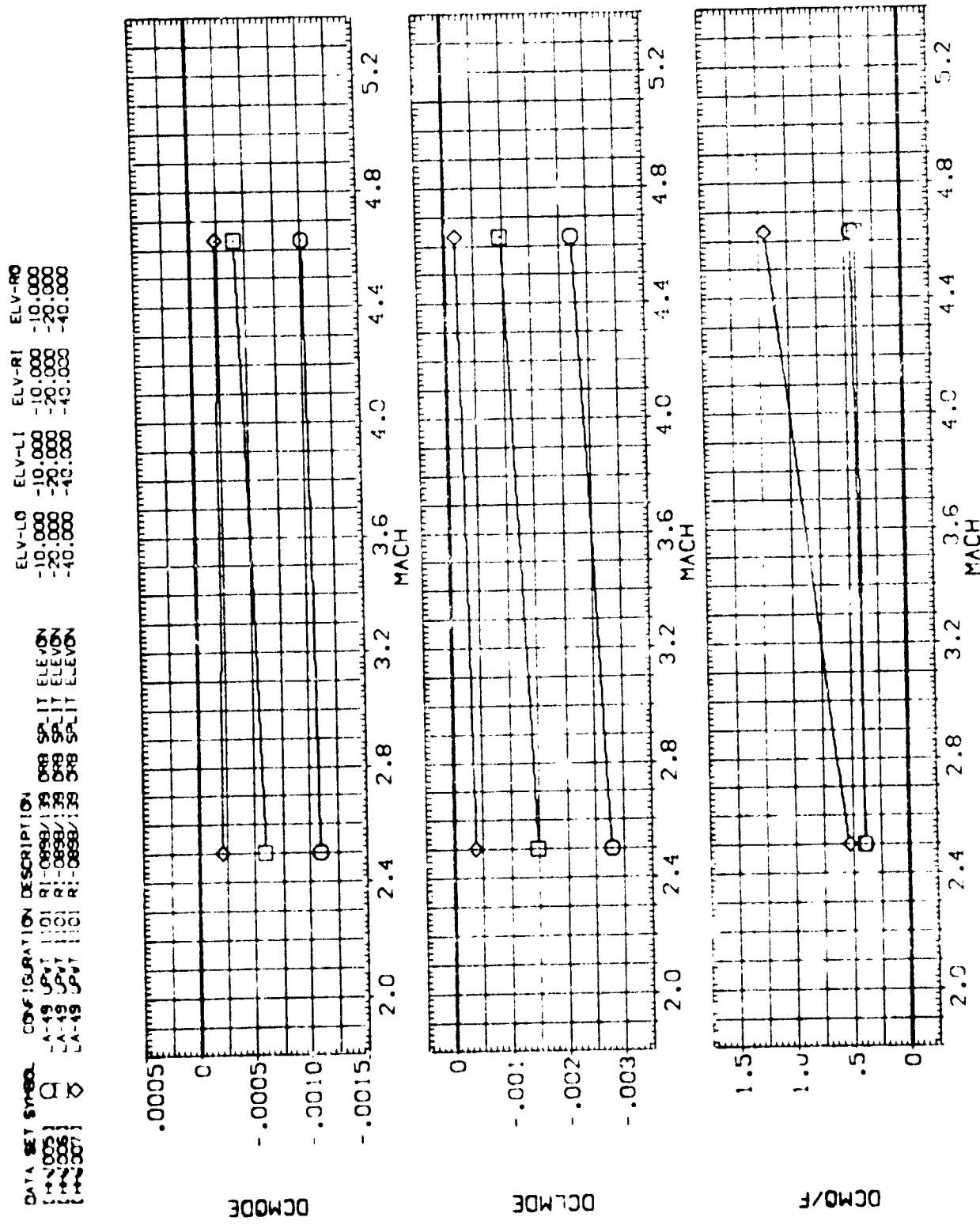


FIGURE 16. COMPARISON OF CONTROL EFFECTIVENESS FOR FULL SPAN AND INBD. ELEVON  
 (A)ALPHA = 28.00

FIGURE 17. COMPARISON OF CONTROL EFFECTIVENESS FOR FIG. 11. SPAN AND CTRN. SURVEY  
 $(\alpha)_{\text{CTR}} = 28.00$



APPENDIX  
TABULATED SOURCE DATA

Plotted data tabulation are available from the Chrysler DATAMAN system  
on request.

LAGE TABELLED SOURCE DATA

רַבָּתִים 101 פְּרִיָּה 139/1998

(8H) 10811

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#### PARAMETRIC DATA

BETA =	.000	BL.V-LO =	.000
E.V-L1 =	.000	BL.V-R1 =	.000
E.V-R0 =	.000	EDFLAP =	.000
ESPEVK =	25.005	AIRFLN =	.000
EVTRK =	.000		

٨/١٥٢

## FIGURE 1

THE JOURNAL OF CLIMATE VOL. 16, NO. 11, NOVEMBER 2003

(RH J 002)

PAPAMETRIC DATA

## LA-49 TABULATED SOURCE DATA

LA-49 UPAT 1101 R1-0898/139 CRB SPLIT ELEMN

PAGE 3

(RHJ003)

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	.000
ELV-L1 =	-20.000	ELV-R1 =	-20.000
ELV-R0 =	.000	BDFAP =	.000
SPOERK =	25.000	ELVTR =	-20.000
ATLTON =	.000		

RUN NO. 22/ 0

MACH	ALPHA	BETA	CN	CA	CLM	CDL	C <sub>L</sub>	C <sub>D</sub>	L/D
2.500	-4.043	.00054	-.15578	.15285	-.00292	-.00142	-.00235	-.14667	.09191
2.500	-.002	.02150	.02053	.11427	-.00144	.00001	-.00139	-.02146	.17874
2.500	4.089	.00082	.11671	.11624	-.02057	-.00126	-.00020	.00156	.000613
2.500	1.138	.02153	.24933	.11377	-.05005	-.00114	-.00043	.00217	.50379
2.500	12.231	.00088	.38635	.11092	-.04554	-.00155	-.00043	.00073	.16723
2.500	16.276	.00021	.53556	.13875	-.05550	-.00123	-.00042	.00291	.25450
2.500	20.413	.00019	.69296	.10568	-.05205	-.00142	-.00025	.00240	.179774
2.500	24.551	.00045	.85974	.10880	-.05101	-.00125	-.00021	.00242	.15545
2.500	28.686	.00048	.10224	.10340	-.05152	-.00144	-.00020	.00159	.47634
2.500	32.740	.00046	.12125	.03544	-.05663	-.00160	-.00020	.00734	.31471

RUN NO. 4/ 0

MACH	ALPHA	BETA	CN	CA	CLM	CDL	C <sub>L</sub>	C <sub>D</sub>	L/D
4.600	-3.557	-.10540	.29149	.03289	.00065	.00049	-.00421	-.09932	.09704
4.600	4.600	-.05374	.03977	.08768	.00055	.00005	-.00317	.06145	.04342
4.600	4.442	.05350	.03250	.08457	-.00005	.00005	-.00474	-.02315	.04723
4.600	2.457	.05395	.31181	.08148	-.00008	.00003	-.00264	.01540	.04339
4.600	4.570	-.05347	.06273	.08148	-.00011	.00004	-.00264	.00222	.16725
4.600	8.320	.04748	.05764	.08129	-.00033	.00003	-.00264	.00343	.09370
4.600	12.511	-.05176	.05719	.07317	-.00017	.00001	-.00217	.00343	.164172
4.600	16.597	-.05176	.05733	.07326	-.00021	.00001	-.00213	.00343	.164172
4.600	20.664	-.05176	.05733	.07321	-.00021	.00001	-.00213	.00343	.164172
4.600	24.722	-.05176	.05722	.07326	-.00040	-.00045	-.00410	.00343	.164172
4.600	28.789	-.05176	.05722	.07326	-.00057	-.00066	-.00491	.00352	.164667
4.600	32.857	-.05176	.05712	.07326	-.00058	-.00096	-.00546	.00360	.164667
4.600	36.925	-.05176	.05719	.07323	-.00059	-.00096	-.00546	.00360	.164667
4.600	40.993	-.05176	.05719	.07323	-.00060	-.00095	-.00546	.00360	.164667

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	.000
ELV-L1 =	-40.000	ELV-RI =	-40.000
ELV-RO =	.000	BDFLAP =	.000
SPDRK =	25.000	ELEVTR =	-40.000
ATLRCN =	.000		

RUN NO. 23/ 0

MACH	ALPHA	BETA	CN	CA	CLH	CBL	CYN	CT	CL	CD	L/D
2.500	-4.072	.02054	-1.06607	.13543	.01396	-.00141	.00021	-.00228	-.17658	.14835	-1.19033
2.500	-0.004	.02113	-.04824	.13293	.00066	-.00114	.00001	-.00259	-.04623	.13293	-.36281
2.500	4.692	.02157	.09402	.12613	-.01544	-.00094	-.00022	-.00269	.08478	.13232	.63973
2.500	6.130	.02217	.23538	.12167	-.02887	-.00091	-.00044	-.00302	.21106	.15306	1.37897
2.500	12.224	.02240	.37379	.11588	-.03695	-.00109	-.00044	-.00338	.34056	.19338	1.76111
2.500	16.315	.02152	.52105	.11333	-.04887	-.00127	-.00044	-.00216	.48224	.23514	1.83522
2.500	20.405	.02245	.68082	.11512	-.05454	-.00137	-.00044	-.00234	.59953	.34090	1.75863
2.500	24.518	.02228	.84530	.10710	-.06329	-.00126	-.00045	-.00234	.72555	.44664	1.61723
2.500	28.632	.02161	1.01544	.10370	-.07231	-.00157	-.00034	-.00202	.84138	.57789	1.45597
2.500	32.770	.02000	1.19972	.09940	-.08383	-.00168	-.00043	-.00266	.95498	.73295	1.30292

FLR. NO. 5/ 0

MACH	ALPHA	BETA	CN	CA	CLH	CBL	CYN	CT	CL	CD	L/D
4.600	-3.524	.04072	-1.11664	.09479	-.02612	-.00015	-.00037	-.00455	-.11059	.10178	-1.08661
4.600	-1.576	.04033	-.07550	.09072	-.02997	-.00002	-.00037	-.00353	-.07277	.09276	-.78457
4.600	4.453	.04087	-.03007	.08733	-.02643	-.00007	-.00038	-.00498	-.03076	.08709	-.35322
4.600	2.465	.04043	.01531	.08398	-.02688	-.00029	-.00039	-.00345	.01168	.08456	.13819
4.600	4.494	.04097	-.06060	-.02071	-.00050	-.00039	-.00039	-.00263	.05416	.08311	.63638
4.600	8.534	.04050	.16715	.07899	-.02920	-.00031	-.00002	-.00021	.15388	.10094	1.32439
4.600	12.570	.03980	.23102	.07750	-.03100	-.00018	-.00041	-.00228	.25746	.13660	1.84470
4.600	16.591	.04052	.40962	.07977	-.03329	-.00054	-.00042	-.00420	.36748	.19168	1.91716
4.600	20.636	.04011	.45112	.08187	-.03492	-.00040	-.00043	-.00316	.48691	.27085	1.79767
4.600	24.778	.04058	.70306	.08467	-.03783	-.00060	-.00046	-.00444	.60311	.37111	1.82517
4.600	28.790	.04131	.96030	.08638	-.04616	-.00080	-.00109	-.00531	.71279	.48975	1.45542
4.600	32.826	.04148	1.03721	.08697	-.05351	-.00061	-.00130	-.00581	.82335	.63703	1.29249
4.600	36.901	.04156	1.21673	.09158	-.06370	-.00071	-.00129	-.00617	.91603	.80381	1.14206
4.600	40.956	.04166	1.39242	.09257	-.07453	-.00082	-.00129	-.00660	.99090	.98200	1.00445



## LA-49 TABULATED SOURCE DATA

LA-49 UPNT 1101 RI-0898/139 TRS SPLIT ELEVON

PAGE 9

(RH1005)

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	-10.000
ELV-L1 =	-10.000	ELV-R1 =	-10.000
ELV-R0 =	-10.000	EFLAP =	.000
SPDRK =	25.000	AIRCON =	.000
ELEVTR =	-10.000		

## RUN NO. 24/0

MACH	ALPHA	C <sub>A</sub>	C <sub>M</sub>	C <sub>D</sub>	C <sub>N</sub>	C <sub>R</sub>	C <sub>L</sub>	CD	L/D
2.500	-4.000	.02174	.14981	.00140	.00001	-.00204	-.14095	.13016	-1.09287
2.500	-3.500	.02147	.01750	.00151	-.00021	-.00109	-.01748	.11707	-1.14929
2.500	-3.000	.02108	.11874	.00124	-.00043	-.00144	-.11031	.12285	.89787
2.500	-2.500	.02140	.25140	.00114	-.00065	-.00205	-.14687	.158620	1.06617
2.500	-2.213	.02239	.39014	.00113	-.00055	-.00395	.16985	.16985	
2.500	15.301	.02236	.53800	.00113	-.00065	-.00281	.25781	.191598	
2.500	20.419	.02202	.68355	.00123	-.00043	-.00440	.61369	.33883	.81182
2.500	24.530	.02230	.65996	.00124	-.00044	-.00427	.73811	.44673	1.465227
2.500	28.648	.02210	1.03571	.00153	-.00032	-.00376	.85904	.57742	1.48773
2.500	32.753	.02144	1.21391	.00137	-.00151	-.00208	.97147	.75359	1.374277

## RUN NO. 6/0

MACH	ALPHA	C <sub>A</sub>	C <sub>M</sub>	C <sub>D</sub>	C <sub>N</sub>	C <sub>R</sub>	C <sub>L</sub>	CD	L/D
4.500	-3.540	.00065	-.00151	-.00012	-.00036	-.00397	-.09372	.09674	-.59447
4.500	-3.000	.00065	-.53835	-.00022	-.00082	-.00037	-.06144	.08654	-.69401
4.500	-2.500	.00065	-.52234	-.00374	-.00112	-.00037	-.02299	.08356	-.27515
4.500	-2.479	.00065	-.52249	-.00118	-.00089	-.00044	-.01935	.09210	.23574
4.500	-2.495	.00065	-.5226	-.00118	-.00066	-.00066	-.00226	.08349	.74199
4.500	8.541	.00065	-.52241	-.00121	-.00068	-.00068	-.02449	.03932	1.5123
4.500	12.552	.00065	-.52159	-.00129	-.00099	-.00035	-.00216	.13468	1.91553
4.500	13.506	.00065	-.52156	-.00129	-.00091	-.00071	-.02399	.37171	1.94612
4.500	20.601	.00065	-.51732	-.00121	-.00074	-.00045	-.01771	.49131	1.61222
4.500	24.729	.00065	-.51115	-.00115	-.00072	-.00045	-.01478	.65613	1.57131
4.500	28.770	.00065	-.50416	-.00115	-.00071	-.00045	-.01164	.72164	1.47283
4.500	32.846	.00065	-.50444	-.00094	-.00109	-.00129	-.00206	.63768	1.30481
4.500	36.891	.00065	-.50431	-.00177	-.00137	-.00129	-.00553	.93117	1.15557
4.500	40.981	.00065	-.50424	-.00165	-.00137	-.00129	-.00618	1.01020	.98666

PARAMETRIC DATA

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	-20.000
ELV-L1 =	-20.000	ELV-R1 =	-20.000
ELV-HO =	-20.000	EDFLAP =	.000
SPDRK =	.25.000	AIRRCN =	.000
ELVTR =	-20.000		

## RUN NO. 25/0

MACH	BETA	CN	CA	CLH	CL	CLN	CT	CD	L/D
2.500	.02011	-1.10009	.12766	.01138	-.00167	-.000002	-.00192	-.15993	-1.20506
2.500	-.018	.02038	.04184	.12272	-.00108	-.00150	-.00024	-.04180	-.34038
2.500	4.000	.02225	.09942	.11768	-.01611	-.00131	-.00058	.08984	.72239
2.500	8.134	.02297	.23314	.11406	-.02658	-.00129	-.00091	.00292	1.4701A
2.500	12.235	.02293	.37010	.11071	-.03404	-.00128	-.00068	.00352	.18683
2.500	16.317	.02216	.51568	.10816	-.04140	-.00138	-.00068	.00245	.48452
2.500	20.401	.02283	.47100	.10487	-.04686	-.00139	-.00045	.00245	.33240
2.500	24.537	.02283	.93314	.10111	-.05199	-.00141	-.00047	.00248	.79170
2.500	28.652	.02256	1.75272	.09535	-.06066	-.00161	-.00059	.00373	.43797
2.500	32.750	.02255	1.10320	.09158	-.07277	-.00198	-.00045	.00374	1.63460

## RUN NO. 7/0

MACH	BETA	CN	CA	CLH	CL	CLN	CT	CD	L/D
3.504	.01114	.11854	.03173	-.02402	-.00030	-.00060	-.00140	-.11033	.00075
4.000	-1.576	.04076	.07510	.00991	-.02319	-.00021	-.00040	-.07280	.09194
4.000	4.000	.04031	.02977	.08822	-.02432	-.00042	-.00061	-.00234	-.78963
4.000	2.475	.04085	.01590	.08288	-.02410	-.00047	-.00081	.00361	.08347
4.000	4.501	.04043	.01979	.06076	-.02387	-.00052	-.00062	-.00269	.14266
4.000	8.516	.04045	.01971	.07690	-.02445	-.00070	-.00083	-.00278	.64223
4.000	12.555	.02143	.27358	.07553	-.02557	-.00037	-.00126	-.00245	.09931
4.000	16.595	.02120	.39059	.07757	-.02579	-.00057	-.00128	-.00186	.1.47635
4.000	20.652	.02120	.53999	.08042	-.02540	-.00061	-.00129	-.00158	.1.86635
4.000	24.723	.02234	.60111	.08223	-.02837	-.00080	-.00132	-.00196	.1.3417
4.000	28.789	.02198	.84972	.08354	-.03368	-.00099	-.00154	-.00326	.25040
4.000	32.857	.02194	1.01870	.08533	-.04063	-.00100	-.00174	-.00333	.1.95977
4.000	36.890	.02207	1.19842	.08560	-.05014	-.00128	-.00174	-.00694	.25612
4.000	40.969	.02307	1.37796	.08643	-.06034	-.00138	-.00174	-.00729	.1.79865

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	-20.000
ELV-L1 =	-20.000	ELV-R1 =	-20.000
ELV-HO =	-20.000	EDFLAP =	.000
SPDRK =	.25.000	AIRRCN =	.000
ELVTR =	-20.000		

## PARAMETRIC DATA

BETA =	.000	ELV-LO =	-20.000
ELV-L1 =	-20.000	ELV-R1 =	-20.000
ELV-HO =	-20.000	EDFLAP =	.000
SPDRK =	.25.000	AIRRCN =	.000
ELVTR =	-20.000		

PARAMETRIC DATA									
RUN NO.	26' 0	BETA	CN	CLM	CYR	CYN	CD	L/D	
ALPHA									
MACH									
1.000	-4.073	.02058	-.21508	.14402	.03137	-.00198	-.20829	-1.50823	
2.000	.002	.02160	.07267	.13898	.01713	.00102	.07267	-.52291	
2.500	4.054	.02145	.06766	.13057	-.00009	.00110	.00245	.43143	
3.000	8.138	.02268	.20452	.12665	-.01166	.00108	.00249	1.19318	
3.500	12.234	.02196	.34746	.12072	-.01903	-.00097	.00329	1.63871	
4.000	16.308	.02214	.49290	.11664	-.02750	-.00103	.00360	1.75876	
4.500	20.430	.02220	.64928	.11215	-.03409	-.00107	.00372	1.71501	
5.000	24.534	.02331	.81233	.10871	-.03872	-.00147	.00349	1.59563	
5.500	28.565	.02239	.97873	.10763	-.04519	-.00149	.00342	1.49597	
6.000	32.755	.02160	1.15439	.10159	-.05599	-.00149	.00294	1.29105	
RUN NO. 26' 0									
ALPHA									
MACH									
1.000	-3.341	.02568	-.13229	.10678	-.10889	-.00040	-.00225	-.11740	
1.500	-1.583	.02131	-.09766	.10328	-.00836	-.00011	-.00193	-.10592	
2.000	-.467	.02160	-.02245	.05751	-.02155	-.00031	-.00327	-.05324	
2.500	2.663	.02134	-.00712	.09319	-.01337	-.00092	-.00206	-.11982	
3.000	4.468	.02143	-.04178	.08244	-.01515	-.00033	-.00129	-.03474	
3.500	6.538	.02181	-.14450	.08343	-.01640	-.00057	-.00127	-.03451	
4.000	12.566	.02225	-.02825	.01816	-.00224	-.00024	-.00300	1.23771	
4.500	16.619	.02141	.38982	.08312	-.01906	-.00061	-.00239	.19106	
5.000	20.570	.02155	.72079	.07334	-.01965	-.00054	-.00149	.46427	
5.500	24.724	.02160	.57587	.08055	-.01957	-.00067	-.00296	.57762	
6.000	28.771	.02201	.93077	.07492	-.02449	-.00086	-.00459	.58445	
6.500	32.860	.02226	1.00375	.06924	-.02444	-.00084	-.00476	.59272	
7.000	36.925	.02246	1.17578	.06929	-.03460	-.00100	-.00547	.60216	
7.500	40.968	.02260	1.35133	.06660	-.04278	-.00111	-.00581	.61221	

## PARAMETRIC DATA

BETA =	.000	EL-V-LO =	-10,000
EL-V-L1 =	.000	EL-V-R1 =	.000
EL-V-RO =	-10,000	EDFLAP =	.000
SPDTR =	25,000	ELEVTR =	-10,000
ATLRDN =	.000		

RUN NO. 27/0

MACH	ALPHA	BETA	CN	CA	CLW	CBL	CYN	CY	CL	CD	L/D
2.500	-4.069	.01970	-.13744	.11699	-.01373	-.00155	-.00020	.00004	-.12870	.12784	-1.00666
2.500	-.023	.02139	-.00542	.11789	-.02705	-.00148	-.00043	-.00185	-.00537	.11789	-.04599
2.500	4.062	.02242	.019073	.11657	-.04070	-.00150	-.00087	-.00216	.12216	.12234	.97466
2.500	6.133	.02277	.26532	.11442	-.05046	-.00110	-.00087	-.00214	.24646	.15081	1.53432
2.500	12.251	.23638	.46438	.11191	-.05826	-.00100	-.00087	-.00324	.37143	.19317	1.90312
2.500	16.314	.02316	.55172	.10971	-.06891	-.00127	-.00086	-.00340	.49869	.26028	1.91598
2.500	20.328	.02276	.70958	.10437	-.07684	-.00128	-.00083	-.00347	.62852	.34347	1.81933
2.500	24.322	.02349	.87773	.10287	-.08727	-.00109	-.00064	-.00459	.75553	.45774	1.65056
2.500	28.633	.02253	1.03405	.09831	-.10211	-.00136	-.00052	-.00387	.87904	.59139	1.48472
2.500	32.749	.02274	1.24166	.09543	-.11674	-.00134	-.00060	-.00425	.99266	.75196	1.32011

RUN NO. 9/0

MACH	ALPHA	BETA	CN	CA	CLW	CBL	CYN	CY	CL	CD	L/D
4.000	-3.824	.02152	-.09785	.09144	-.05342	-.00011	-.00078	-.00371	-.09204	.09728	-1.94616
4.000	-1.561	.02119	-.06015	.08763	-.03263	-.00017	-.00079	-.00284	-.05774	.08924	-.64704
4.000	-.454	.02118	-.01640	.08481	-.03134	-.00021	-.00071	-.00171	-.01949	.08465	-.23025
4.000	2.473	.02177	.02281	.08217	-.03232	-.00044	-.00048	-.00123	-.01924	.08308	-.23162
4.000	4.491	.02131	.06015	.07965	-.03278	-.00048	-.00048	-.00123	-.02113	.06171	.08472
4.000	8.524	.02129	.17452	.07673	-.03322	-.00050	-.00124	-.00205	.16122	.10175	1.58444
4.000	12.547	.02154	.28831	.07705	-.03640	-.00016	-.00167	-.00166	.26468	.13784	1.92019
4.000	16.530	.02231	.411076	.07887	-.04076	-.00034	-.00549	-.00277	.37801	.19321	1.93639
4.000	20.667	.02170	.56369	.08151	-.04643	-.00018	-.00168	-.00219	.50052	.27591	1.81404
4.000	24.729	.02208	.72118	.08379	-.05345	-.00019	-.00170	-.00327	.62000	.37780	1.64106
4.000	28.786	.02230	.88520	.08628	-.06312	-.00018	-.00191	-.00391	.73515	.50235	1.46341
4.000	32.831	.02233	1.06534	.08817	-.07932	-.00021	-.00210	-.00412	.84784	.65280	1.29976
4.000	36.906	.02229	1.25336	.09119	-.09423	-.00008	-.00209	-.00413	.94745	.82557	1.14764
4.000	40.956	.02317	1.44026	.09244	-.11190	-.00015	-.00208	-.00426	1.02709	.101391	1.01300

## LA-49 TABULATED SOURCE DATA

LA-49 UPWT 1101 R1-0898/139 CFB SPLIT ELEVON

PAGE 9

(RHJ000)

## PARAMETRIC DATA

	BETA	CN	CLW	CDL	CY	CD	L/D
	.000	.000	.000	.000	.000	.000	-1.0508
	EL-V-L1 =	.000	.000	.000	.000	.000	-1.1249
	EL-V-R1 =	-20.000	BDFLAP =	.000	.000	.000	.90578
	SPIORK =	25.000	EL-CM =	-20.000	.000	.000	1.56051
	ALURON =	.000					1.87331
RUN NO.	28/ 0						
MACH	ALPHA	BETA	CN	CLW	CDL	CY	CD
2.500	-4.073	.72004	-.14747	.12122	-.00013	-.00022	-.13849
2.500	-.012	.02170	-.01348	.11961	-.002126	-.00151	-.00227
2.500	4.092	.02173	.12278	.11785	-.0343	-.00142	-.00115
2.500	8.143	.02207	.25703	.11540	-.04491	-.00112	-.00238
2.500	12.222	.02335	.39534	.11299	-.03274	-.00121	-.00380
2.500	16.314	.02253	.54124	.11028	-.06267	-.00120	-.00246
2.500	20.406	.02308	.70082	.10705	-.07053	-.00149	-.00392
2.500	24.533	.02241	.86914	.10337	-.08095	-.00130	-.0042
2.500	28.631	.02298	1.04134	.09874	-.09363	-.00139	-.00445
2.500	32.754	.02320	1.22753	.09808	-.11033	-.00147	-.00487
RUN NO.	10/ 0						
MACH	ALPHA	BETA	CN	CLW	CDL	CY	CD
4.000	-3.547	.02207	-.10921	.09361	-.00086	-.00121	-.10321
4.000	-1.567	.02170	-.05777	.08893	-.02861	-.00053	-.00306
4.000	1.484	.02127	-.02222	.08582	-.02839	-.00036	-.00193
4.000	2.481	.02087	.01923	.08285	-.02862	-.00123	-.00087
4.000	4.490	.02141	.06481	.08021	-.02867	-.00124	-.00239
4.000	6.526	.02141	.16744	.07716	-.02922	-.00098	-.00236
4.000	12.548	.02163	.28103	.07734	-.03033	-.00167	-.00192
4.000	16.623	.02091	.41449	.07899	-.03660	-.00071	-.00126
4.000	20.643	.02143	.52157	.08153	-.04098	-.00072	-.00127
4.000	24.676	.02207	.71155	.09207	-.04812	-.00073	-.00171
4.000	28.781	.02244	.90592	.08647	-.05837	-.00090	-.00193
4.000	32.851	.02234	1.05771	.08876	-.07056	-.00089	-.00212
4.000	36.891	.02253	1.23906	.09648	-.08402	-.00096	-.00211
4.000	40.972	.02249	1.42602	.09163	-.10031	-.00106	-.00210

## PARAMETRIC DATA

BETA = .000 ELV-L0 = -40.000  
 ELV-L1 = .000 ELV-RL = .000  
 ELV-RO = -.40.000 EDFLAP = .120  
 SPDRK = 25.000 EL-EVTR = -40.000  
 ATLFCN = .000

RUN NO. 29/ 0

MACH	ALPHA	BETA	CN	CA	CLW	CDL	CY	CL	CD	L/D
2.500	-4.062	.51994	-.16612	.13038	.00287	-.00126	.00022	-.00146	.14196	-1.11623
2.500	-.013	.02186	-.02992	.12799	-.01141	-.00127	-.00022	-.00018	.12760	-.23425
2.500	4.050	.02146	.10821	.12423	-.02535	-.000790	-.00044	-.00197	.13158	.75382
2.500	6.134	.02177	.24285	.12070	-.03860	-.00068	-.00043	-.00248	.22333	1.45156
2.500	12.237	.02299	.36398	.11679	-.04587	-.00068	-.00042	-.00429	.35041	.19551
2.500	16.324	.02209	.53346	.11373	-.05770	-.00076	-.00042	-.00303	.47959	.25909
2.500	20.410	.02308	.68963	.10821	-.06347	-.00105	-.00042	-.00450	.60806	1.77946
2.500	24.500	.02337	.95432	.10562	-.07400	-.00105	-.00020	-.00557	.73667	.45339
2.500	28.613	.02196	1.03210	.10131	-.08676	-.00123	-.00031	-.00360	.85733	.58320
2.500	32.732	.02326	1.21547	.09968	-.10271	-.00103	-.00040	-.00554	.96046	1.30697

RUN NO. 11/ 0

MACH	ALPHA	BETA	CN	CA	CLW	CDL	CY	CL	CD	L/D
4.000	-3.526	.00102	-.12401	.10423	-.01864	-.00019	-.00081	-.00231	.11176	-1.01166
4.000	-1.550	.02052	-.08221	.09922	-.01830	-.00024	-.00081	-.00128	.07996	.10145
4.000	-.467	.12. 4	-.03746	.09398	-.02030	-.00027	-.00124	-.00260	.03622	-.40801
4.000	2.479	.02119	.00793	.08941	-.02075	-.00049	-.00124	-.00144	.00404	.09007
4.000	4.495	.02149	.05709	.08632	-.02169	-.00053	-.00123	-.00278	.05014	.09053
4.000	6.517	.02158	.10599	.08136	-.02454	-.00071	-.00071	-.00280	.14231	.10358
4.000	12.568	.02176	.27775	.08080	-.02832	-.00037	-.00168	-.00219	.25332	.13931
4.000	16.589	.02134	.40773	.08199	-.03263	-.00073	-.00127	-.00145	.36735	.181985
4.000	20.627	.02165	.54137	.08446	-.03702	-.00057	-.00170	-.00285	.48643	.28396
4.000	24.700	.02124	.75751	.08707	-.04334	-.00075	-.00172	-.00193	.60561	.37517
4.000	28.759	.02264	.96932	.08960	-.05232	-.00075	-.00193	-.00213	.71915	.49690
4.000	32.855	.02173	1.05017	.09215	-.06445	-.00074	-.00213	-.00240	.83220	.64714
4.000	36.893	.02270	1.23373	.09508	-.07807	-.00084	-.00212	-.00316	.92299	.81672
4.000	40.970	.02263	1.41639	.09643	-.06354	-.00075	-.00211	-.00316	1.00773	1.00492

#### PARAMETRIC DATA

THE JOURNAL OF CLIMATE

PH 10121

PHOTOGRAPHIC DATA

BETA =	.000	ELV-LO =	-10,000
ELV-L1 =	-10,000	ELV-R1 =	-30,000
ELV-RO =	-30,000	BOFLAP =	.000
SPOKE1 =	25,000	ALTRON =	10,000
ELVENT =	-20,000		

31/0

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REF BUE  
CPC



PIRANDELLO D'AT

BETA =	.000	BL-V-LO =	.0000
EL-V-L1 =	-20.000	EL-V-R1 =	-20.000
EL-V-RO =	-40.000	BDFLAP =	.0000
SPDRK =	25.000	ELEVTR =	-20.000
ANALYN =	20.000		

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10

143

## TABULATED SOURCE DATA

JA-49 SPRT 11:01 7 3898/139 CRS SPLIT D.EVN

(RHJN19)

PAGE 19

## PARAMETRIC DATA

BETA =	.500	E.V-L0 =	-10.000
E.V-L1 =	-20.000	E.V-R1 =	-20.000
E.V-R0 =	-50.000	E.DFLD =	.500
E.DFLX =	25.000	E.EVRC =	-20.000
A.FRCN =	10.000		

24.0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

## LA-49 UPWT 1101 N1-0698/139 ORB SPLIT ELEVON

(RH-J016)

## PARAMETRIC DATA

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BETA = .0000 ELV-LO z 10,000
ELV-LI = -20,000 ELV-RI = -20,000
ELV-RO = -10,000 BDFLAP = .0000
SPDRK = 25,000 ELEVTR = -20,000
ALRDN = 10,000

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RUN NO. 35/ 0

MACH	ALPHA	BETA	CN	CA	CLM	CDL	CYN	CT	CL	CD	L/D
2.500	-4.047	.02087	-.13388	.12321	-.00164	.00140	-.00044	-.00103	-.14447	.13575	-1.06426
2.500	.017	.02198	-.01981	.12165	-.01338	.00166	-.00089	-.00146	-.01937	.12165	-1.16087
2.500	.049	.02196	.11837	.11818	-.02844	.00203	-.00133	-.00029	.10973	.12624	.86922
2.500	.126	.02407	.23261	.11579	-.03971	.00253	-.00176	-.00218	.23370	.15034	1.55445
2.500	.1235	.02429	.39762	.11350	-.04898	.00301	-.00178	-.00254	.36458	.19499	1.86971
2.500	.16.312	.02396	.53997	.11119	-.03862	.00358	-.00158	-.00151	.48700	.25838	1.86849
2.500	.20.434	.02533	.70124	.10841	-.06631	.00414	-.00223	-.00229	.61927	.34641	1.78764
2.500	.24.535	.02572	.85447	.10542	-.07369	.00498	-.00247	-.00292	.74264	.45487	1.63266
2.500	.28.639	.02578	1.03679	.10090	-.08567	.00526	-.00281	-.00244	.86158	.58548	1.47157
2.500	.32.751	.02680	1.21993	.09667	-.10015	.00574	-.00313	-.00307	.97569	.74128	1.31353

RUN NO. 17/ 0

MACH	ALPHA	BETA	CN	CA	CLM	CDL	CYN	CT	CL	CD	L/D
3.600	-3.608	.02248	-.10656	.09361	-.03033	.00109	-.00163	-.00403	-.10036	.10013	-1.00426
3.600	-1.803	.02211	-.06301	.08971	-.02877	.00104	-.00164	-.00304	-.06217	.09149	-.64282
3.600	.475	.02170	.02364	.08622	-.02998	.00117	-.00164	-.00198	.02435	.08602	-.28309
3.600	2.457	.02264	.02186	.08347	-.02975	.00095	-.00207	-.00336	.01628	.08433	.21675
3.600	4.133	.02224	.06333	.08072	-.03026	.00107	-.00208	-.00232	.05690	.08538	.66644
3.600	6.337	.02223	.16597	.07773	-.03069	.00198	-.00208	-.00240	.15277	.10124	1.56904
3.600	12.504	.02293	.27976	.07925	-.03343	.00244	-.00294	-.00201	.25618	.13696	1.87044
3.600	18.403	.02369	.40554	.07933	-.03584	.00295	-.00294	-.00406	.36547	.19120	1.91655
3.600	20.958	.02311	.36867	.08355	-.03930	.00397	-.00293	-.01260	.50117	.28143	1.77079
3.600	24.681	.02411	.70890	.08587	-.04390	.00483	-.00339	-.00418	.60828	.37404	1.62625
3.600	26.952	.02494	.87018	.08795	-.05298	.00589	-.00402	-.00506	.72145	.49442	1.49919
3.600	32.865	.02537	1.09043	.09099	-.06315	.00657	-.00465	-.00544	.83316	.64612	1.28849
3.600	36.844	.02596	1.23056	.09279	-.07344	.00698	-.00464	-.00549	.92698	.81203	1.14403
3.600	41.541	.02607	1.43615	.09314	-.08682	.00742	-.00548	-.00538	1.01316	.99125	1.02216

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	ALPHA	BETA	CH	CA	CLH	CBL	CIN	CR	CL	CD	L/D
1.22, 5.00	-4.081	.08102	-.18425	.13852	.01381	.00191	-.00091	-.00240	.14926	-1.16005	
2.22, 5.00	.012	.02101	-.04410	.13429	.00046	.00178	-.00045	-.00123	.13430	-3.20115	
2.22, 5.00	4.070	.00183	.09803	.12779	-.01676	.00207	-.00089	-.01526	.09869	.65975	
8.141	.02282	.2815	.12351	.02979	.00267	-.00134	-.00155	.21824	.15599	1.39936	
12.234	.28347	.38075	.11893	-.0345	.00325	-.00158	-.00193	.34690	.19691	1.76168	
16.324	.02440	.52995	.11563	.04906	.00373	-.00211	-.00211	.47604	.25993	1.83182	
20.430	.72573	.69291	.11267	.05783	.00420	-.00224	-.00347	.50812	.34676	1.75374	
24.533	.12017	.4456	.10972	-.06331	.00466	-.00248	-.00338	.73186	.45464	1.60937	
28.506	.02625	1.02533	.10649	-.07616	.00531	-.00283	-.00308	.64557	.58529	1.44983	
32.500	.02619	1.20471	.10247	-.02920	.00570	-.00315	-.00244	.35756	.73004	1.26759	

JUN NO. 18/0

Run No.	18/0	Alpha	Penta	Cn	Ca	Cl <sub>M</sub>	Cl <sub>A</sub>	Cn	C <sub>M</sub>	C <sub>A</sub>	L/D
1.600	-3.543	.02267	-1.1803	.09456	-.02394	.00108	-.00164	-.11184	.10367	-.17878	
1.600	-1.615	.02229	-.07534	.09253	-.02340	.00104	-.00169	-.00349	.09464	-.77876	
1.600	.420	.02184	-.03696	.08864	-.02455	.00087	-.00165	-.00233	.08861	-.35573	
1.600	2.337	.02280	.01032	.08565	-.02577	.00093	-.00208	-.00378	.08600	.08666	
1.600	4.42	.02231	.07919	.08211	-.02757	.00106	-.00208	-.00251	.08648	.61343	
1.600	6.536	.02230	.16995	.07867	-.02812	.00174	-.00209	-.00251	.10243	1.48654	
1.600	12.369	.02253	.27612	.07898	-.02833	.00242	-.00252	-.00232	.23231	.13716	1.95350
1.600	16.491	.02333	.40573	.05900	-.03506	.01294	-.00253	-.00423	.38653	.19274	1.96923
1.600	20.728	.02326	.59737	.04052	-.03534	.00395	-.00298	-.00301	.49138	.27633	1.77825
1.600	24.709	.02422	.76510	.08780	-.03913	.00498	-.00340	-.00446	.60394	.37450	1.61239
1.600	28.758	.02498	.86282	.09008	-.04755	.00567	-.00403	-.00543	.71306	.49375	1.44424
1.600	33.023	.02551	1.04669	.09320	-.05626	.00634	-.00466	-.00577	.82581	.64537	1.27482
1.600	37.030	.02603	1.22659	.09522	-.06516	.00695	-.00508	-.00619	.92127	.81551	1.12969
1.600	41.135	.02654	1.40611	.09771	-.07514	.00754	-.00550	-.00657	.99480	.99617	.99617

#### PARAMETRIC DATA

BETA	=	.000	ELV-LO	=	10,000
ELV-Y-L1	=	-40,000	ELV-Y-R1	=	-40,000
ELV-Y-RO	=	-10,000	BDFLAP	=	.000
SPDRV	=	25,000	ELEVTR	=	-40,000
ALTRCN	=	10,000			

$C_T$	$C_L$	$C_D$	L/D
-.00240	-.17407	.14926	-1.16805
-.00123	-.04407	.13430	-.32815
-.00128	.09869	.15442	.65375
-.00155	.21824	.15599	1.39906
-.00193	.34690	.19691	1.76188
-.00211	.47608	.25993	1.83182
-.00347	.60812	.34676	1.75374
-.00338	.73186	.45464	1.60935
-.00308	.84957	.56529	1.44943
-.00244	.35765	.73904	1.25759

CY	CL	CD	L/D
-.001449	-.111684	.10367	-1.07878
-.003150	-.003730	.09464	-1.77876
-.002233	-.03161	.08661	-3.55673
-.003778	-.00702	.08600	.08166
-.00251	.05303	.08648	.61343
-.00251	.15243	.10243	1.48654
-.00232	.25231	.15716	1.95350
-.003423	.36603	.19274	1.96923
-.00301	.49138	.27653	1.77825
-.00446	.60334	.37450	1.61239
-.00543	.71306	.49375	1.44424
-.00377	.82681	.64657	1.27482
-.00619	.92127	.81551	1.12968
-.00657	.99480	.99882	.99617

PARAMETRIC DATA

BETA	=	.000	ELV-LO	=	10,000
ELV-Y-L1	=	-40,000	ELV-Y-R1	=	-40,000
ELV-Y-RO	=	-10,000	BDFLAP	=	.000
SPDRV	=	25,000	ELEVTR	=	-40,000
ALTRCN	=	10,000			

$C_T$	$C_L$	$C_D$	L/D
-.00240	-.17407	.14926	-1.16805
-.00123	-.04407	.13430	-.32815
-.00128	.09869	.15442	.65375
-.00155	.21824	.15599	1.39906
-.00193	.34690	.19691	1.76188
-.00211	.47608	.25993	1.83182
-.00347	.60812	.34676	1.75374
-.00338	.73186	.45464	1.60935
-.00308	.84957	.56529	1.44943
-.00244	.35765	.73904	1.25759

CY	Q	CO	L/D
-.001449	-.111684	.10367	-1.07878
-.003150	-.057370	.09464	-1.77876
-.002233	-.03161	.08661	-3.55673
-.003778	-.00702	.08600	.08166
-.002551	.05303	.08648	.61343
-.002551	.15243	.10243	1.48654
-.002322	.25231	.15716	1.95350
-.003423	.36603	.19274	1.96923
-.003301	.49138	.27653	1.77825
-.004446	.60334	.37450	1.61239
-.005453	.71306	.49375	1.44424
-.003577	.62681	.64657	1.27482
-.006119	.92127	.81551	1.12968
-.006557	.99480	.99862	.99617

(RH-1016)

## PARAMETRIC DATA

```
BETA = .0000 Q.V-I.O = -20.000
ELV-LI = -30.000 Q.V+I.O = -30.000
ELV-FO = -40.000 EDFLAP = .000
SPOSK = 25.000 EL.EVTR = -30.000
ATLCON = 0.000
```

RUN NO. 3710

WACH	ALPHA	BETA	CY	CA	CLW	CBL	CYN	CL	CY	CD	L/D	
2.500	-4.060	.01785	-.20014	.13741	.02461	.00127	.00112	-.00034	.16991	.15123	-1.25373	
2.500	-1.001	.01953	-.05960	.13309	.01004	.00069	.00068	-.00066	.05960	.13309	-1.44794	
2.500	4.053	.01953	.01953	.08232	.12711	-.00398	.00136	.00046	.00065	.07334	.13262	.53295
2.500	6.150	.01957	.01957	.12322	.12273	-.01654	.00139	.00070	-.00274	.19861	.15257	1.35625
2.500	12.229	.02031	.06097	.11658	.02465	.00084	.00047	.00035	.00035	.36009	.16735	1.73234
2.500	16.322	.02105	.06284	.11298	.03381	.00038	.00024	-.00024	.00029	.45410	.25067	1.61151
2.500	20.432	.02171	.06403	.10980	.03091	.00046	.00046	-.00046	.58398	.33432	1.74574	
2.500	24.532	.02239	.06533	.02343	.05453	-.04451	-.00012	.00044	.00047	.75714	.43264	1.61214
2.500	28.633	.02303	.06682	.02133	.01049	-.01889	.00014	-.00013	.00015	.82250	.55458	1.45666
2.500	32.733	.02369	.07099	.117318	.05386	-.00370	.00024	.00023	-.00024	.93409	.71839	1.35351

R.JN. (C.) 1970

W.CD	ALPHA	BETA	CY	CA	CLW	CBL	CYN	CL	CY	CD	L/D
4.000	-3.140	.02070	-.12657	.10137	-.01416	.00369	.00048	-.00033	-.12063	.10456	-1.11114
4.000	-1.501	.02071	-.06463	.09732	-.01406	.00286	.00047	-.00046	-.06603	.09961	-.63388
4.000	.586	.02075	-.04664	.09280	-.01590	.00215	.00004	-.00043	-.04726	.09248	-.51104
4.000	2.592	.02141	.05279	.38925	-.01762	.00159	-.00039	-.00042	-.00120	.05629	-.01361
4.000	4.503	.02141	.01721	.0442	-.01971	.00137	-.00040	-.00034	.04533	.04830	.51339
4.000	6.502	.02154	.02354	.01831	-.01657	.00083	-.00083	-.00083	.13818	.10146	1.36195
4.000	8.502	.02154	.02354	.0216	-.02024	.00064	-.00127	-.00285	.24592	.13722	1.79215
4.000	10.504	.02154	.02354	.02132	-.02063	.00027	-.00129	-.00326	.34315	.18479	1.95097
4.000	20.703	.02324	.03392	.02324	-.01876	.00023	-.00130	-.00411	.47601	.26862	1.76284
4.000	24.703	.02324	.03392	.02324	-.01757	.00021	-.00126	-.00544	.53336	.35413	1.85213
4.000	28.806	.02329	.04442	.03712	-.02662	.00019	-.00156	-.00649	.69719	.48431	1.43957
4.000	32.792	.02336	.05050	.03942	-.03213	.00035	-.00218	-.00477	.78799	.52023	1.28595
4.000	36.900	.02337	.051657	.04143	-.03982	.00041	-.002176	-.00793	.89399	.70555	1.13804
4.000	41.739	.02318	.039654	.03159	-.04935	.00066	-.00176	-.00761	.98105	.99808	.98298